

## Is Independent Suspension a Cure for Front End Troubles?

A critical survey of what automotive engineers think about the unconventional springing which is expected to feature a number of 1934 models

by Athel F. Denham

Field Editor,  
Automotive Industries\*



**M**OST readers probably know of, or have heard reports of, the very considerable amount of work which has been carried on recently in this country on so-called independent suspension systems, and many, no doubt, have wondered exactly why this mass attention should suddenly be given to car suspension.

I don't know yet the answer to that question, unless it is that the considerable publicity and discussion given to the subject in the technical press in this country and

abroad in recent years stimulated a few to investigate the subject for themselves, and their activities in turn decided other engineering departments to follow suit.

To the question: "What did you expect to accomplish by a fundamental change in car suspension?" almost every engineer interviewed gave a different answer. Perhaps the most general hope was that in independent suspension might be found a final and complete solution of the perplexing problems of wheel fight, shimmy, shake and tramp, which have confronted the industry almost continuously since

the introduction of the balloon tire back in 1923.

This would explain why most of the experimentation has been on front-wheel suspension systems rather than on complete car suspension or independent springing of rear wheels only. However, I do not wish to create the impression that the rear end of the automobile has been entirely neglected in these investigations. It has not.

In my efforts to correlate the findings of different experimenters, it became apparent rather early that the various types of suspension under investigation would have to be

\* S.A.E. paper presented before the Detroit Section on Nov. 6 and the Philadelphia Section on Nov. 8.

segregated and identified if some of the findings were to be made intelligible. Fortunately, the great variety of systems can be grouped in a few fundamental types.

### General Considerations:

However, before going into a discussion of these fundamental suspension systems, I would like to bring out a few general considerations with respect to car suspension, for a better understanding of what is to follow.

First—whether or not a rigid axle connects the wheels, an equal displacement in the same direction of either the two front or the two rear wheels—as in driving over a railroad track at right angles—produces the same spring action in every suspension system irrespective of spring location, assuming spring rates, spring periods, etc., to be the same.

Second—This, however, is not true for displacements of wheels in opposite direction. The diagrammatic drawings of Figs. 1, 2 and 3 illustrate the point. I am not going to go through the proof, but it can easily be shown that, for opposed wheel displacement, the springing action for nearly all so-called independent suspension systems would be duplicated in a conventional rigid axle design by locating the springs at the center lines of the wheels.

If the inclined lines BB in the diagrams are taken as ground reference lines, the positions of the wheels represent opposed displacement with respect to the ground, one wheel having been displaced upward, the other down. Obviously, in such a case the restoring forces in the springs of Fig. 3 are greater than those in Fig. 1. The restoring forces in the independent-suspension system are the same as those in Fig. 3. Incidentally,

in the average conventional automobile the restoring forces for displacement of wheels in opposed directions are the same as for wheels displaced in the same direction.

While this unequal springing effect for different wheel movements tends to give independently sprung cars a slightly erratic ride on really rough roads at times, the disadvantage is more than offset by the gains in car stability on curves at high speeds.

To illustrate, look at the diagrams with lines AA as the ground reference lines. The illustrations now represent the attitude of the cars while rounding a curve. Note that to all effects this represents an opposed displacement of the wheels with reference to the chassis. The arrow indicates the direction of the centrifugal force exerted on the center of gravity of the car, while the lines running downward from the center of gravity indicate the length of the lever arm of the centrifugal force about the instantaneous center of rotation for the chassis and body assembly.

Note that in the conventional car this center is located in the plane of the spring pads. In most independently-sprung designs the center is located at or near the ground. The centrifugal moment exerted on the car, attempting to overturn it, is therefore much larger with the average system of independent springing, being roughly doubled, depending on the height of the center of gravity, of course.

This increased tendency to roll is more than overcome, however, by the increased resistance of springs to opposed displacement of the wheels. As a matter of fact, on the average car, 25 to 50 per cent softer springs can be used with independent suspension, as compared with rigid axle construc-

tions, without increasing the tendency for the body to roll.

However, with the independent suspension depicted, there is a large "lean" of the wheels toward the outside of the curve. This characteristic, common to all independent-suspension systems in which it is attempted to hold the wheels parallel to the frame during displacement, tends to produce hard steering on curves at high speed, and scuffing of the outsides of treads if conventional tire designs are used.

Fundamental findings with respect to individual types of suspension may be summarized as follows (Figs. 4, 5, 6 and 7):

### Spring Parallelogram:

In spring parallelograms as tried on cars in this country so far, the springs continue to perform the function of guiding the wheels and absorbing or transmitting brake torque and side thrusts.

With upper and lower springs of the same length, the system is characterized by parallel displacement of the wheels with respect to each other and with respect to the frame, avoiding gyroscopic couples. Due to the parallelogram action, however, a displacement of the wheels produces a change in width of track. Apparently, these variations are within the flexing limits of present-day tires, for little trouble from tread wear has been found when the steering geometry was correct. If necessary, of course, this variation could be minimized by making the lower springs slightly longer than the upper ones, thereby permitting a slight tilt of the wheels during displacement.

On the question of how many springs should be used, results seem to indicate that for heavy cars four springs, two at the top and two below,

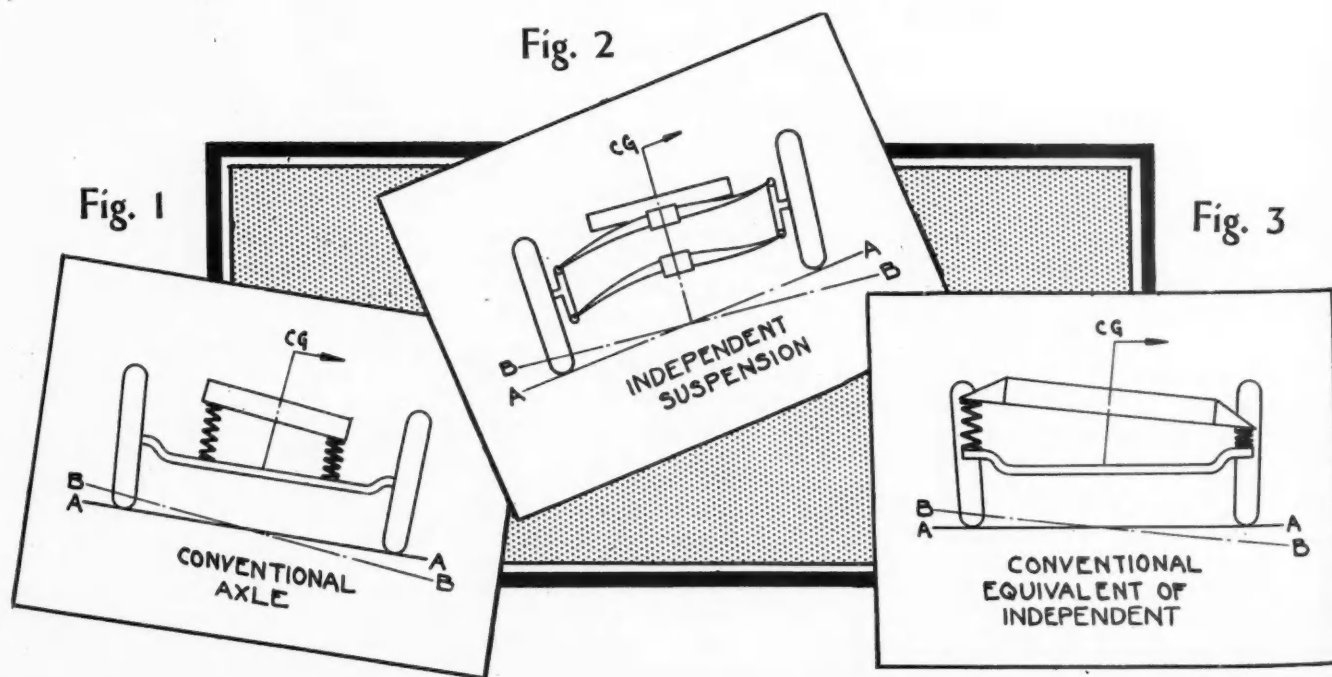


Fig. 6

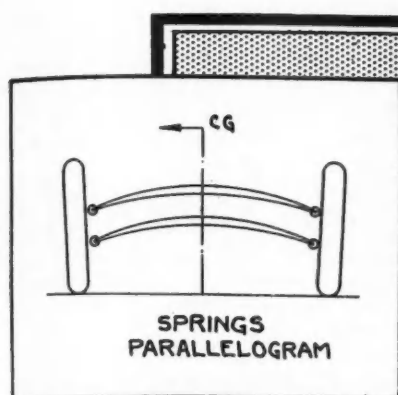


Fig. 4

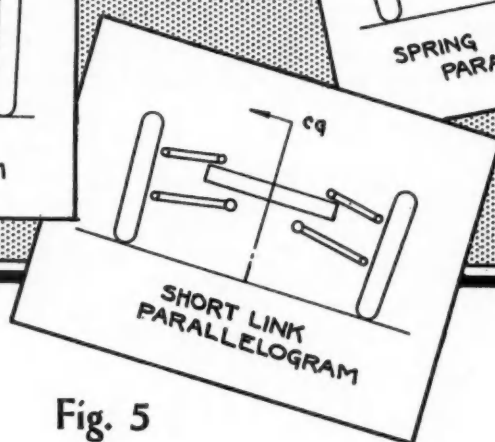


Fig. 5

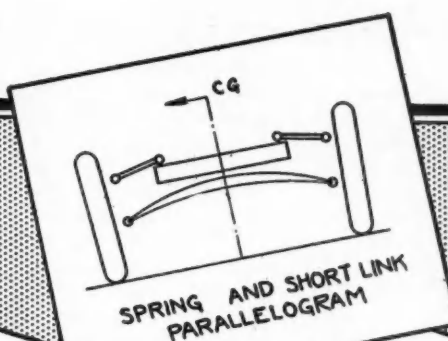
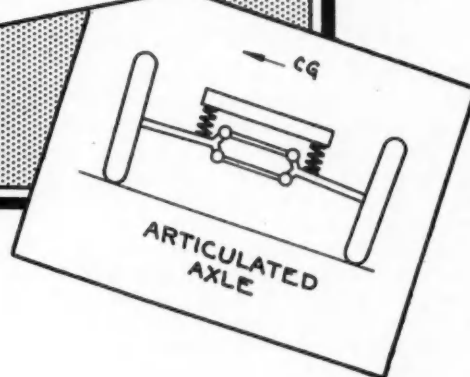


Fig. 7



are desirable. In lighter cars—say up to 3000 lb.—it is permissible to use only two wide springs, one above the other, thereby effecting a reduction in cost. Radius rods to prevent axle roll (especially under brake torque) do not seem to be essential with such an installation, unless very flexible springs are used, the amount of spring twist under brake application being well within the limits experienced with conventional suspensions.

It is the general opinion that if only two springs are used the second leaf of the spring should also wrap the spring eye, for safety in case the main leaf should break.

With either four- or two-spring types, it seems desirable to use either rubber bushings or anti-friction bearings at the spring eyes.

Spring parallelograms, I am told, permit a considerable increase in overall spring flexibility without setting up unduly high spring stresses. The importance of this point will be dealt with later.

There seem to be fewer structural limitations to the adoption of this system at the rear than at the front of an automobile. If radius rods are not used, car stability has to be watched, to avoid what might be termed "rear wheel steering," a snaking motion, noticeable, for instance, when driving with one wheel along the asphalt joint in the center of a concrete highway. With this overcome, four spring parallelograms at the rear have shown good results.

I have already mentioned the increased centrifugal moment on curves with this type of suspension, and the outward lean of the wheels. This lean is aggravated slightly at high speeds by a tendency of the springs to buckle under the side thrust. Individual

steering to the wheels, working out from the fixed center or fulcrum point of the springs, has been found to help in overcoming the tendency toward hard steering on curves.

The design permits a good steering geometry, generally, and relative freedom from steering-wheel kick, in spite of the operating changes in caster and camber which can occur.

Although there is a relative absence of gyroscopic couples, with displacement of wheels in their own planes, shimmy has been experienced with this type of design. It is different in character from that found with conventional axles. One reason for this shimmy may be in the changes in wheel camber (wheel lean) occasioned by transverse oscillation of the front end of the frame, if not sufficiently rigid.

Tramp may also be experienced with the design if the frame is not sufficiently rigid.

### Spring and Short Link Parallelogram: (Fig. 6)

Substitution of links to the frame for the upper spring in the previous system makes it possible to relieve the spring of brake torque if the links are made in a wishbone form.

The length of the link in relation to the effective radius of the arc in which the spring eye travels determines the relative change in camber and track width when wheels are displaced. Designs so far generally have been along the lines of holding the track variation close to zero, permitting some camber variation. The latter apparently has not introduced any serious shimmy problem of its own accord. Wheel fight experienced with this design has probably been

due to faulty geometry rather than anything inherent in the suspension.

Problems with respect to wheel lean on curves, producing hard steering, are the same as for the spring parallelogram. Excessive tire wear has been reported with this design, particularly where the link arms were proportioned to hold wheels parallel, and permit some change in track. Some of this may have been due to the more rigid guiding of the wheels than in the case of the spring parallelogram. Another possibility is that spring stiffness may have contributed, the records showing that where excessive tire wear occurred, spring rates were relatively high. Faulty geometry, however, is the most likely cause.

Lowering of spring rates with this design is not as simple a matter as with the spring parallelogram. Two springs, one behind the other at the bottom, would probably be desirable to avoid unduly high stresses in such a case. This difficulty in the way toward lowering spring rates probably accounts for reports that the improvement in riding qualities was not as great as with other designs.

The design has some advantage over the spring parallelogram for front-end installation, from clearance considerations.

The majority of experimenters report that anti-friction bearings, particularly cageless rollers, have been found superior to rubber bushings in the linkage. Such bearings should have generous proportions.

The rigid link increases the shocks transferred to the frame. An exceedingly rigid frame is necessary to keep body and chassis joints tight with conventional body-to-frame assembly.

The link in this design can be used



for a shock absorber arm if desired, eliminating added shock absorber linkage.

For rear suspensions the results have not been very favorable, probably because the proportioning of the link was not such as to prevent a change of track. Decreased sideways flexibility of the system compared with the spring parallelogram may be a contributing cause to the "rear-wheel steering" effect occasionally noted.

### Short Link Parallelogram: (Fig. 5)

This design represents a further step in the complete separation of the wheel guiding and springing functions of a suspension system. As one result, a very good steering geometry can be laid out, avoiding wheel fight. Another advantage is that in spring design only the springing effect has to be taken into consideration. It permits (at least theoretically) a greater lowering of spring rates than other parallelogram types discussed. No springs are shown in the diagram, but either transverse or longitudinal leaf springs, or coil springs, can be used.

The relative lengths of upper and lower links determine the camber and track changes which will take place when the wheels are displaced. Most engineers have adhered closely to a zero track variation, permitting some camber change. This apparently has not increased the shimmying tendency, in spite of the gyroscopic couples produced. Possible reasons are:

1. The rigidity of the wheel guiding.
2. Lower periods of oscillation designed into the experimental installations, as compared with conventional suspensions.
3. Possible damping effect obtained from the flexing of tires with wheel displacement.

As to stability on curves, the same considerations hold true as for other parallelograms. Wheel lean on curves can be slightly reduced by permitting a change in camber to be produced with opposed displacement of the wheels, but with really soft springs this is insufficient in itself to overcome the increased steering effort required.

Lateral stiffness of frames is particularly important with this design, since side thrusts are transmitted without material cushioning directly to the frame.

Closer manufacturing tolerances for frames, links, etc., apparently would have to be maintained with this than with most suspension designs, to obtain correct wheel alignment and steering geometry. Experience indicates, however, that provisions for service adjustment of wheel alignment should be provided. Camber and toe-in adjustment could be obtained either by shimmying the link brackets at the frame or by an adjustment in the links themselves. Provision for an ad-

justment of caster presents an interesting problem.

Experiences indicate that in this design, frictionless bearings are decidedly preferable to rubber bushings. Plain bushings do not appear to find favor for the link joints from a service lubrication point of view and also because of the wear factor involved.

Bearings at the link joints should be generous in capacity. Some trouble has been experienced also with ball-type wheel bearings, probably, due to side shocks. Such bearings should have more thrust capacity than with conventional systems.

### Long and Short Link Parallelogram:

Another variation in transverse parallelograms (not illustrated here because little experience has been had with it in this country) consists of short links from the top of the king-pins to the frame and a long link connecting the lower ends of the two king-pins. This might really be called a semi-independent suspension system, since deflections of one wheel will produce some effect upon the other wheel also. A characteristic of this design is that it multiplies the side thrust on the frame in curves. It does not seem to offer any particular advantages over the short link parallelogram.

### Articulated Axle: (Fig. 7)

This is another semi-independent suspension system. It consists of a conventional suspension in which the center section of the axle I-beam is

replaced by two parallel links hinged at both ends, and one above the other, the links having forked ends to maintain alignment. I am not sure just where the instantaneous center of this car is located, for rolling on curves, but I am inclined to believe it is close to the ground, as in the parallelogram types. The centrifugal effect appears to be about the same.

With standard-rate springs, front-end stability on rough macadam is reported as better than a rigid axle. Experiences with shimmy vary according to car design. No serious tramp has been found with this axle, apparently.

Outward lean of wheels on curves is present, as with other suspensions. With lower rate springs, this lean should be greater. Absence of excessive recovery in the steering in curves at high speeds, which would be expected with a conventional steering hook-up, may be due in part to the relatively high friction in the joints of the articulated levers in the experimental installations. The decided change in toe-in which occurs when the wheels lean may offer some correcting tendency also.

No excessive increases in distortion of standard frames have been reported with this design.

The design has a tendency to increase rather than decrease unsprung weight. However, for a one wheel kick-up, it is possible that the effective unsprung mass may be lower, due to the articulation.

If results warrant its use, the design would have the advantage that its adoption would not require major car-design changes.

Part 2 will appear in an early issue

## Plane That Set a New Altitude Record

A new world's altitude record for airplanes, of 13,661 meters or 44,808 ft., has been established by Gustave Lemoine with a modified Potez 50 plane, built by Aeroplanes H. Potez of Paris. Following are the principal specifications of the machine with which the record was established:

The plane is of composite metal and wood construction with fabric wing covering. It is of the biplane type with wings of unequal size. The fuselage is of single-seater design. The landing gear comprises independently sprung wheels and the tail skid is of the H. Potez type. The engine is mounted on a metallic, detachable mounting frame. A Gnome-Rhone 14 Kors engine and a specially designed Gnome propeller were fitted. Following are the principal dimensions:

Wing span, 29.9 ft.  
Total length, 15.12 ft.  
Total height, 5.86 ft.  
Wing area, 580 sq. ft.  
Weight of machine empty but with regular instrument equipment and fixed accessories, 3350 lb.  
Weight of initial fuel supply, 437 lb.  
Weight of oil, 66 lb.  
Weight of pilot with parachute and heating suit, 176 lb.  
Weight of oxygen equipment and controls, 48.5 lb.  
Weight of storage battery, 55 lb.  
Weight of barographs, 13 lb.  
Total weight, 4150 lb.  
Specific weight, 7.16 lb. per sq. ft.  
Consumption of fuel during ascent, 430 lb.  
Weight at ceiling, 3720 lb.  
Specific weight at ceiling, 6.42 lb. per sq. ft.



# JUST AMONG OURSELVES

## Export Market Looks Good

A FEW weeks ago it looked as though the increased car prices which loom ahead might check the renewed export activity which the industry has had this year. Transportation and tariff charges always are high on foreign shipments. A low priced car in this country usually ends up as a middle priced one by the time it gets on retail sale abroad.

Devaluation of the dollar may help to offset much of the effect of increased prices so far as overseas markets are concerned. The stimulating sales effect of a basically rising price curve, nevertheless, will not be lost. The basic forces working toward world trade improvement will be added factors in offsetting deterrent effect of higher prices on export sales.

We found export expert George F. Bauer unusually optimistic, incidentally, when we talked with him the other day.

\* \* \*

## The 30-Hr. Week Bill Again

Rumors persist around Washington that the 30-hour bill, buried in the last Congress when NRA came into being, will be brought back to life when the solons convene again. The measure had plenty of support when it came up before and current industrial disputes over the question of hours seem likely to nourish that support in the next

Congress rather than diminish it.

Automotive operations would be seriously hampered by such a law, unless major exceptions were made possible, yet the danger of enactment cannot be said to have passed.

\* \* \*

## Automatic Transmission Perfected in New Drake

HAVE you heard about the new, perfectly functioning automatic transmission that's going on the Drake Motor Car Co. models next year? Well, we got all the low-down last Saturday. It was designed by an engineer named Jim Thorne, whom Drake hired away from Universal Motors—they had to get him to break a contract, but when Alison Drake gets an idea, it just *has* to be carried out.

Don't say you've never heard of the Drake Motor Car Co.? Well, it has tremendous plants and we heard the sales manager say that it did 17.8 per cent of the car business last year. It was built up by Old Man Drake and has been operated since his death by his daughter Alison, who is the fastest-cracking executive you ever saw in the daytime, even if she does have a Catherine of Russia complex which extends far into the night . . . Yes, it's all in a motion picture. It's called "Female" and Ruth Chatterton is the star.

If our eyes didn't deceive us, the Drake Motor Car Co. was shooting Plymouths from the

end of its assembly line, although President Alison Drake rode in a Cord town car and drove a Chrysler roadster. One eager young executive makes a bid for executive favor by proposing the startling idea of boosting sales by holding pep meetings for dealer salesmen—"like we used to have in college before big football games." Miss Drake herself orders special letters to wives of salesmen as a sales stimulant.

\* \* \*

## Highways and Car Sales

WRITING with infinite charm and interest in the British *Autocar* of a London to Istanbul (Constantinople to you) automobile tour, W. F. Bradley, European correspondent of *Automotive Industries*, comments particularly on the transformation which has taken place in Hungary in the last few years from dirt roads to modern highways. Secondary as well as primary arteries are being improved in that country, he says, adding the following interesting figures:

"During the road construction period from 1924 to 1928 the number of cars in Hungary increased from 5,965 to 24,250. In 1910, Hungary, then a bigger country than it is now, possessed only 1,047 cars. At the present time 65 per cent of the cars are registered in the capital, and of the entire traffic of the country 72 per cent is animal drawn."

\* \* \*

TO the eye of the average automobile owner, the sight of considerable body overhang in the rear is not beautiful. Mr. Car Owner is going to get used to plenty of overhang, however, as streamlined bodies become more and more common.

What's more, we predict it won't be long until he actually likes it.—N. G. S.

# U. S. Car Sales Up 28% in Units and 8.5% in Dollars in First Nine Months

## U. S. New Car Registrations and Estimated Dollar Volume by Manufacturing Groups—First Nine Months of 1933 and 1932

	Percentage of Total Units		Percentage of Total Estimated Dollar Volume	
	1933	1932	1933	1932
Chrysler Corp. ....	25.0	17.0	23.3	17.0
Ford and Lincoln ....	20.0	22.7	17.8	17.8
General Motors ....	44.9	43.0	46.9	41.8
Total .....	90.1	82.7	88.0	76.6
All Others .....	9.9	17.3	12.0	23.4
Total .....	100.0	100.0	100.0	100.0

## U. S. Registrations of New Passenger Cars and Estimated Dollar Volume by Retail Price Classes—First Nine Months of 1933 and 1932

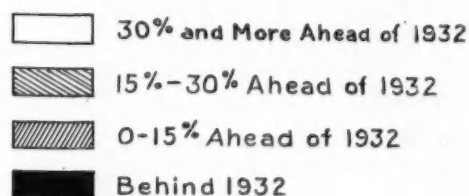
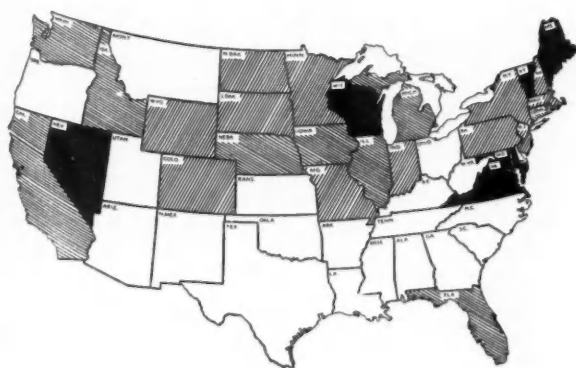
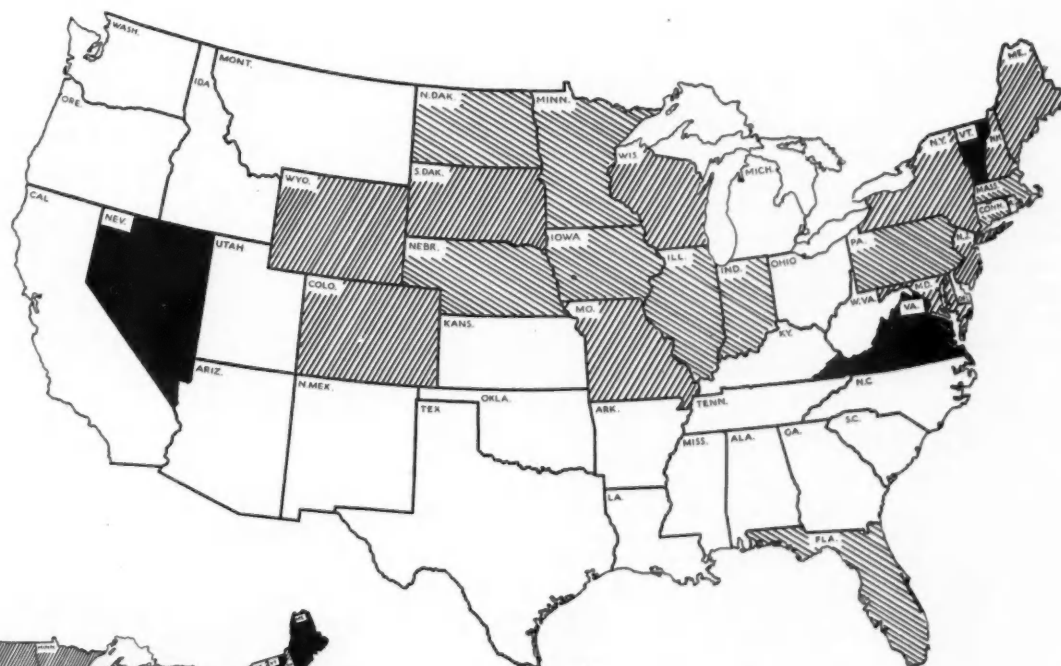
	Units		Per Cent of Total		Per Cent Change		Estimated Dollar Volume		Per Cent of Total		Per Cent Change
	1933	1932	1933	1932			1933	1932	1933	1932	
Chevrolet, Ford and Plymouth .....	830,817	592,800	69.0	63.0	+40.0	Chevrolet, Ford and Plymouth .....	\$456,000,000	\$349,000,000	57.8	48.0	+30.9
Others under \$750 .....	202,586	68,855	16.8	7.3	+194.0	Others under \$750 .....	132,000,000	47,000,000	16.7	6.5	+181.0
\$750-\$1,000 .....	93,500	165,441	7.8	17.6	-43.5	\$750-\$1,000 .....	79,000,000	144,000,000	10.0	19.8	-45.1
\$1,000-\$1,500 .....	50,133	67,804	4.1	7.2	-26.1	\$1,000-\$1,500 .....	59,000,000	82,000,000	7.5	11.3	-28.0
\$1,500-\$2,000 .....	10,665	23,231	0.9	2.5	-54.2	\$1,500-\$2,000 .....	18,000,000	39,000,000	2.3	5.4	-53.8
\$2,000-\$3,000 .....	11,608	16,029	1.0	1.7	-27.5	\$2,000-\$3,000 .....	28,000,000	41,000,000	3.5	5.6	-31.7
\$3,000 and over .....	4,406	6,702	0.4	0.7	-34.4	\$3,000 and over .....	17,000,000	25,000,000	2.2	3.4	-32.0
Total .....	1,203,715	940,862	100.0	100.0	+28.0	Total .....	\$789,000,000	\$727,000,000	100.0	100.0	+8.5
Miscellaneous .....	949	2,301									
Total .....	1,204,664	943,163									

## U. S. Registrations of New Passenger Cars and Estimated Dollar Volume by Retail Price Classes—September, 1933 and 1932

	Units		Per Cent of Total		Per Cent Change		Estimated Dollar Volume		Per Cent of Total		Per Cent Change
	1933	1932	1933	1932			1933	1932	1933	1932	
Chevrolet, Ford and Plymouth .....	112,482	55,683	71.3	68.3	+102.0	Chevrolet, Ford and Plymouth .....	\$62,000,000	\$33,000,000	62.0	55.0	+88.0
Others under \$750 .....	25,795	5,684	16.3	7.0	+354.0	Others under \$750 .....	17,000,000	4,000,000	17.0	6.7	+325.0
\$750-\$1,000 .....	12,116	13,626	7.7	16.7	-11.3	\$750-\$1,000 .....	9,000,000	12,000,000	9.0	20.0	-25.0
\$1,000-\$1,500 .....	4,854	3,281	3.1	4.0	+48.0	\$1,000-\$1,500 .....	6,000,000	4,000,000	6.0	6.7	+50.0
\$1,500-\$2,000 .....	656	1,278	0.4	1.6	-48.6	\$1,500-\$2,000 .....	1,000,000	2,000,000	1.0	3.3	-50.0
\$2,000-\$3,000 .....	1,631	1,343	1.0	1.7	+21.6	\$2,000-\$3,000 .....	4,000,000	3,000,000	4.0	5.0	+33.0
\$3,000 and over .....	379	606	0.2	0.7	-37.5	\$3,000 and over .....	1,000,000	2,000,000	1.0	3.3	-50.0
Total .....	157,913	81,501	100.0	100.0	+94.0	Total .....	\$100,000,000	\$60,000,000	100.0	100.0	+66.7
Miscellaneous .....	63	392									
Total .....	157,976	81,893									

# Car Sales Lead Last Year in 45 States at End of September

At the end of nine months, only three states were behind last year's passenger car sales record. Twenty-three states show gains of more than 30 per cent!



## New Passenger Car Registrations Nine Months 1933 and 1932 Compared

	Per Cent Increase 1933 Over 1932*
Alabama	58.0
Arizona	40.3
Arkansas	64.2
California	33.1
Colorado	10.1
Connecticut	29.8
Delaware	25.5
Dist. of Col.	5.3
Florida	28.8
Georgia	59.5
Idaho	37.3
Illinois	26.4
Indiana	24.5
Iowa	28.2
Kansas	57.5
Kentucky	41.6
Louisiana	37.3
Maine	6.3

	Per Cent Increase 1933 Over 1932*
Maryland	3.1
Massachusetts	19.8
Michigan	36.8
Minnesota	19.1
Mississippi	59.0
Missouri	9.9
Montana	40.0
Nebraska	28.6
Nevada	-8.3
New Hampshire	14.0
New Jersey	12.1
New Mexico	49.5
New York	12.8
N. Carolina	72.5
N. Dakota	15.3
Ohio	50.0
Oklahoma	54.0
Oregon	43.5

	Per Cent Increase 1933 Over 1932*
Pennsylvania	20.8
Rhode Island	31.0
S. Carolina	92.1
S. Dakota	10.9
Tennessee	61.3
Texas	63.1
Utah	58.2
Vermont	-12.0
Virginia	-1.5
Washington	38.0
West Virginia	42.8
Wisconsin	1.3
Wyoming	12.7
Total	28.0

\* - = decrease.



# Can the RIGHT Interpretation Confuse Section 7A?

John Thomas Smith says President's  
"Merit Clause" letter leaves the  
difficulty unsolved\*

It is unfortunate that the clarification of Section 7a of the Recovery Act by the President's letter to General Johnson, dated Oct. 19, misses the point and leaves the difficulty unsolved. To say that any interpretation of Section 7a would only lead to further controversy and confusion and should not be incorporated in any code is a mere begging of the question. Could the right interpretation confuse the matter? Should the right interpretation of any doubtful relation be taboo?

Is the President of the opinion—which really doesn't legally matter, since the construction of laws rests with the judiciary and not the executive under the Constitution—that the merit clause, the so-called right to hire and fire regardless of affiliation, is the correct interpretation of the law of the land?

## Half Persuasive Agreement

The letter implies so, though the argument is only half persuasive. It says:

"While there is nothing in the provisions of Section 7a to interfere with the bona fide exercise of the right of an employer to select, retain or advance employees on the basis of individual merit . . ."

Now, every lawyer knows that the right to hire and fire comes from the general law of the land, and all that Section 7a prescribes on this subject is that employees shall not be fired or hired because of union affiliations. Perhaps the omission in the President's letter of the phrase usually appearing in the merit clause, "regardless of membership in any organization," was not altogether accidental. In practice, despite the clear legal right of the employer not to have a closed shop forced on him, thereby coercing him into refusing employment

to non-union men, the strong arm of the NRA, with Presidential support, has forced closed shops down unwilling throats in seeming defiance of Section 7a itself. Witness the coal and steel codes and the quarrels of union against union.

## Yellow-Dog Contracts

Certainly it is an anomaly if union labor has succeeded in outlawing yellow-dog contracts against union labor and simultaneously under the guidance of the NRA has fastened on industry yellow-dog contracts against all non-union labor.

To recur to the President's letter—immediately following the part quoted above, it says, referring to the right to hire and fire on merit:

" . . . Section 7a does clearly prohibit the pretended exercise of this right by an employer simply as a device for compelling employees to refrain from exercising the rights of self-organization, designation of representatives and collective bargaining, which are guaranteed to all employees in said Section 7a."

Here again there is regrettable confusion. What is meant by a bona fide exercise of a right to hire or fire on merit? Did any one ever hear of a bona fide exercise of the right to vote, to work, to enjoy life, liberty and the pursuit of happiness? For good or for ill, all of these rights may be enjoyed in good faith or bad faith, since the motive has nothing to do with the right. So the rights of employees to collective bargaining, etc., and the right of the employer to hire and fire cannot be cut down

by the good faith or bad faith of the employer or the employee.

## Not a Question of Faith

It follows that an employee under the act has the right to collective bargaining in bad faith just as well as good faith. Likewise the employer has the right in bad faith, if you please, to refuse to hire men because he does not like their red hair or to fire employees who wear red shirts. It is the right that matters in case of employer and employee alike, not the motive of its exercise.

When, therefore, the President's letter of clarification shows that the President himself needs light on the effect of the merit clause on employer and employee, who will make bold enough to say that the matter should not be cleared up by the right interpretation, embodied in the very codes themselves, like 7a itself, so that he who runs may read?

According to General Johnson himself and Mr. Richberg, counsel for the NRA, the following clause states the law:

Employers in this industry shall comply with the following requirements of Section 7a of Title I of the National Industrial Recovery Act:

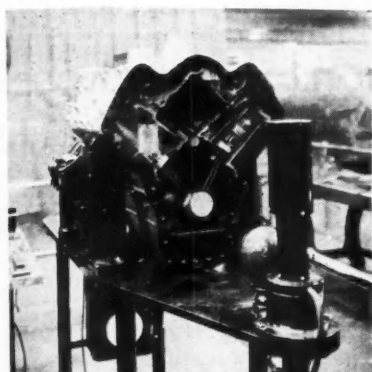
1. Employees shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from the interference, restraint or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted ac-

(Turn to page 591, please)

\* Letter to the editor of the New York Times. Mr. Smith is vice-president and general counsel of the General Motors Corp.

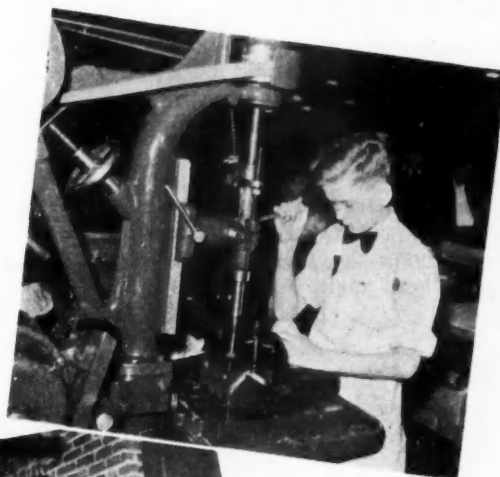
# Close-ups at the Detroit Ford Exhibit Which Drew More than a Million Visitors

Displays staged by Ford company and its suppliers prove to be of outstanding public interest



Left — Stroboscope shows what happens in V-8 engine at 1800 r.p.m.

Below — Student demonstrating work at the Henry Ford Trade School exhibit



Below — Detroit's Mayor, John W. Smith, looks at Henry Ford's first engine



Below — Briggs show how all-steel bodies are flash-welded

Below — Multipleater in action manufacturing upholstery sets



Above — Youngsters were especially welcome at the show. Two of them are sitting in the first Ford car



# Getting Optimum Modern Cutting

A survey of the factors to be considered in the selection of the proper material for each job.

**W**HEN it comes to the profit possibilities of metal-cutting tools one is confronted with an amazing variety of cutting tool materials each of which has its own attributes, each of which, undoubtedly, is entitled to a place in the scheme of automotive production.

This brings up the questions—what is the place of each of the commercially available cutting tool materials; what are the boundary lines imposed by their inherent limitations; where do they overlap; how can we utilize them most efficiently?

Practical men know how difficult—if not impossible—it is to answer these questions with any degree of positiveness. From an academic point of view we can assure the reader that it would be even more difficult to find the answers in current literature. Perhaps the simplest explanation for this state of affairs is to point to the fact that metal cutting involves a large number of variables which defy comparison in the present state of the art. These variables differ from

department to department in the same shop, they differ from plant to plant, they differ from industry to industry.

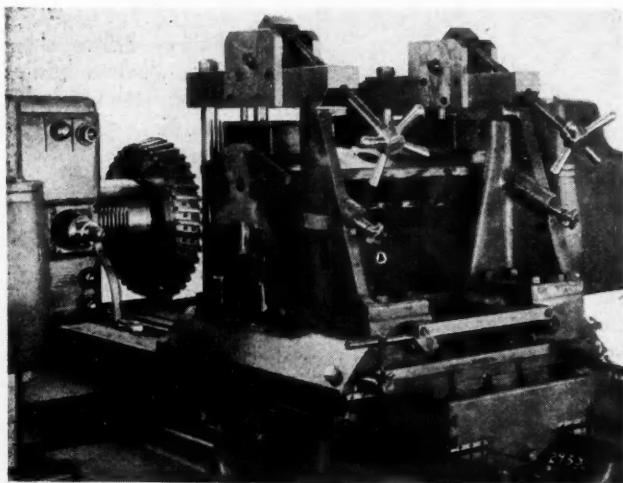
Apparently the best that anyone can do at present is to tackle the problem within his own plant, work out each tool set-up separately and in so doing endeavor to develop a standardized procedure productive of the best results. The object of this article is to show what factors should be considered in a program of this kind.

Now it is certain that no hard and fast rules can be established either from existing literature or from the experience of metal cutting shops here and there. That this is so is borne out by the project

undertaken by the special research committee on the cutting of metals of the American Society of Mechanical Engineers. During the course of the past six months or more this committee accumulated a large amount of data on metal cutting from some of the largest plants in the country. But, upon analysis, it is found that these data resist attempts at correlation. Why?—because of the lack of standardization of the fundamental elements that enter into metal cutting. Thus, while these data indicate the trends—the obvious superiority of certain cutting tools over others—the information thus obtained is purely qualitative and cannot be applied directly to other operations.

We may conclude, therefore, that the general standardization of speeds and feeds, as well as the selection of cutting tool materials cannot be achieved before national standards are established and then only if the standards are adopted either by industry in general, or at least by some large subdivision such as is made up by the automotive plants.

Just to show some of the complexities of the problem we have compiled in Table I a brief list of a few of the better known cutting tool materials. Needless to say, an almost endless variety of steels is possible due to the permutations and combinations of alloys such as tungsten, vanadium, cobalt, chromium, molybdenum, and others, also through the added variations in carbon content. Similar variety is noted in the non-ferrous hard metal compositions of the carbides which started out with a single grade of tungsten carbide and now embrace



Large diameter inserted tooth milling cutter facing cylinder block represents a good problem of selection.



# Results from Cutting Tool Materials

by Joseph Geschelin  
Engineering Editor, Automotive Industries

a variety of types and grades each of which has been designed for a specific kind of work.

Generalizing, briefly, the selection of a cutting tool material for a given job depends upon the following factors:

1. Hardness (physical). The cutting tool must be materially harder than the material being cut. However, there is a limiting value to this hardness beyond which a further increase may be useless or even undesirable.

2. Strength and toughness have a minimum value which is absolutely essential.

3. Red hardness, the ability of the cutting edge to do its work at elevated temperatures has great importance where tools are subjected to high operating temperatures. Thus carbon tool steels are limited to temperatures below 500 deg. Fahr., whereas high-speed tool steel will hold its edge around 1100 deg. Fahr. It is claimed that Stellite and Haynes J-metal have a red hardness about 75 per cent greater than that of high-speed tool steel, while the cemented carbides are said to exceed even this value.

4. Ease of fabrication as well as a combination of the other factors further limits the selection of materials in their application to special forms of tooling.

5. Tool cost is perhaps the governing factor since there is usually a minimum cost for any tool and also a maximum above which the use of more costly material becomes uneconomical. This element will be affected by such considerations as production lot sizes, length of life between grinds, degree of usage, etc.

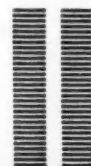
At this point we may profitably examine some of the general attributes of the commonly used cutting tool materials along the lines suggested in the excellent paper by J. V. Emmons, metallurgist of the Cleveland Twist Drill Co.<sup>1</sup>

<sup>1</sup>"Materials for Modern Cutting Tools," by J. V. Emmons, Paper read before the A.S.M.E. at the National Metals Congress, 1932.

**Carbon Tool Steel**—Its characteristics are: great hardness; high degree of toughness—especially under shock; ease of fabrication; easily varied degrees of hardness or temper; and, finally, low cost. Another important characteristic, pointed out by several in-

vestigators is its desirability in places where fine finish is required, due to a very fine crystal structure which develops a smooth, keen edge.

This material is losing ground in high production shops because of

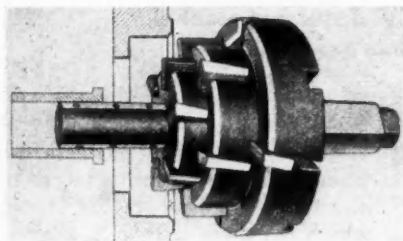


**Table I**  
**Commercial Cutting Tool Materials**

CLASS	VARIETIES
Ferrous	Carbon Tool Steel
	<ol style="list-style-type: none"> <li>1. Iron and carbon</li> <li>2. Addition of 0.50 per cent chromium, vanadium</li> <li>3. Addition of 1 per cent or more chromium, tungsten, molybdenum, manganese</li> <li>4. Finishing steel—4 per cent tungsten, 1 per cent chromium</li> </ol>
	Intermediate Alloy Steels
Non-ferrous	High Speed Steels
	<ol style="list-style-type: none"> <li>1. 18 per cent tungsten — 4 per cent chromium, 1 per cent vanadium</li> <li>2. 14 per cent tungsten, 4 per cent chromium, 2 per cent vanadium</li> <li>3. Cobalt steels with 4 to 12 per cent cobalt</li> <li>4. Molybdenum steels</li> <li>5. Variations due to different percentage of carbon</li> </ol>
	Stellite Haynes J-Metal Cast Carbide Alloys Cemented Carbides
	<ol style="list-style-type: none"> <li>1. Tungsten carbide</li> <li>2. Tantalum carbide</li> <li>3. Variations comprising mixtures of tungsten and tantalum, also changes in bonding materials</li> </ol>
	Diamond



November 11, 1933



Fairly complex multiple tool arrangement demands great care in the selection of the right kind of tool material for each step

the demand for high-speeds and the consequent development of high temperatures at the cutting edge.

Many intermediate grades have been introduced between carbon steel and high-speed steel, through the addition of various alloying elements such as chromium, tungsten, molybdenum, etc. These have many useful applications particularly for large twist drills, dies, and forming tools.

**High-Speed Tool Steel**—The various cutting tool materials which can be grouped under this generic heading are the most widely used for tools in high-production shops. The most prominent member of this group is the well-known 18-4-1 high-speed steel (18 per cent tungsten, 4 per cent chromium, 1 per cent vanadium) which possesses as its best talking point a peculiar ability to maintain hardness, strength, and cutting quality at high operating temperatures. As a matter of fact, these steels may be used where the temperature at the cutting edge approaches 1100 deg. Fahr.

As in the case of carbon tool steels, the properties of high-speed tool steels may be greatly changed by varying the carbon content. For instance, the variety with a carbon content of 0.40 to 0.50 per cent is used in dies for hot work, while that with a carbon content from 0.70 to 0.80 is used where a high

degree of hardness is required but where toughness is not so essential.

Cobalt has found increasing use in recent years as an addition in the high-speed steels of the general 18-4-1 composition. Tool steels containing some 4 to 12 per cent cobalt are now commercial, while still higher percentages have been tried experimentally. The most popular application of this tool material has been for lathe tools and tool bits. An important characteristic is an increase in hardness over the 18-4-1 steel which is, however, attained at the expense of some toughness. The most important advantage is probably a widening of the range of temperatures in which satisfactory hardening may be obtained since the addition of cobalt makes the steel more fool-proof in heat treatment.

One of the promising developments in this field is a variety of tool steels in which molybdenum is the principal alloying constituent. While such steels have not in the past achieved wide commercial utilization, much has been done recently to overcome the disadvantages which have handicapped their use. A detailed account of the work along this line is given in another paper by Emmons.<sup>2</sup> Such steels are now available commercially and are being used extensively for hacksaws and other tools.

Quoting from "Molybdenum 1933" just published by the Climax Molybdenum Co.: "In contents up to 3 per cent molybdenum has been incorporated in many high-speed steels for years past as a partial replacer of tungsten, and also as a toughener and hardness-retainer in the commoner grades of tool steels such as those used for the manufacture of chisels. In the latter especially, the effect of molybdenum on widening the hardening range is of great value. Molyb-

denum is found to be a most suitable alloy for incorporation in those steels which are used in hot work heading-dies. Molybdenum is also employed extensively in steel used in the manufacture of drop-forging die-blocks.

"Molybdenum, up to 10 per cent in complete replacement of tungsten, has been tested and the steels exhibited the property of exceptional red hardness."

**Hard Metal Alloys**—Among the materials that may be mentioned under this classification are: Haynes-Stellite, and the more recent Haynes J-metal, both being largely alloys of cobalt, chromium and tungsten cast and ground to the finished form. Their principal property is the peculiar ability to retain hardness at high operating temperatures probably several hundred degrees higher than high-speed tool steel will withstand. This makes possible a much higher order of operating speeds and feeds. General recommendation for turning, facing and boring with Haynes J-metal is given in Table 2.

Perhaps the greatest flurry in recent years was caused by the introduction of the cemented carbides for extremely high rates of production and for many difficult tasks which could not be handled by high-speed steels and other special alloy steels. The first alloy to be introduced commercially was cemented tungsten carbide which was limited in its use to cast iron, malleable iron and non-ferrous metals and non-metallic materials in general. It was not very successful on steel applications.

This was followed by the development of tantalum carbide which was found to handle certain steel applications much more satisfactorily. Since then the manufacturers of cemented carbide, and this includes such well-known names as Carboloy, Widia, Firthite, Strauss metal, Ramet and Vascaloy have developed numerous types including mixtures of tantalum carbide and tungsten carbide in varying proportions. Variations in grade are produced by changing the kind and amount of bonding material.

For an example of the practice in this direction we refer to an article by Roger D. Prosser<sup>3</sup> describing the applications of various grades of Widia. Similarly a description of the varieties of Carboloy and their applications will be found in Carboloy Handbook and Catalog No. M-32.

In the light of current experience

<sup>2</sup>"Some Molybdenum High-Speed Tool Steels," by J. V. Emmons, Transactions ASST, Vol. 21, No. 3, March, 1933.

<sup>3</sup>"Variety of Grades Open New Fields for Cemented Carbides," by Roger D. Prosser, Automotive Industries, Oct. 29, 1932.

with cemented carbide tools in the automotive industry, it is needless to add to a story which is familiar to production-minded executives. For reference purposes, Table 3 gives the recommended speeds and feeds for Widia tools.

Production records established by Carboloy tools over a period of several years will be found in the files of the Carboloy Magazine.

One of the most recent contributions to this literature is the paper by Judkins and Uecker of the Firth-Sterling Steel Co.<sup>4</sup> which features a table giving recommended tool angles for various materials operating at various cutting speeds, maintaining approximately 1/32 in. feed and 1/8 in. depth of cut.

<sup>4</sup> "Cemented Carbide Cutting Tools," by Malcolm F. Judkins and William C. Uecker. Paper read before the Machine Shop Practice Division, A.S.M.E., during Engineering Week at the Century of Progress Exposition.

<sup>5</sup> "Standard Tests for Metal Cutting Tools," by Robert C. Deale, *Mechanical Engineering*, Oct., 1932, *Industrial Standardization*, April, 1933.

A new alloy, alloy 548, although not as yet commercially released, was announced this spring at a meeting of the American Society for Steel Treating in Cleveland by the Carboloy Company, Inc., It consists principally of iron, tungsten and cobalt, and has a most unusual characteristic in that it functions best as a carbon-free alloy. Its hardness is not inherent, as cast, but is developed by quenching and by ageing. It can be melted, cast, forged or rolled, then machined and heat treated for use. At the time of the announcement it was stated that preliminary tests in production showed that Alloy 548 had qualities midway between high speed steel and the cemented carbides. Subsequent field tests which have been steadily progressing since spring confirm this original statement. Performance figures show that 548 performs economically at higher speeds than high speed steel and gives a particularly noteworthy performance on the ma-

chining of the several alloy steels.

Given the well-known characteristics of cutting tool materials, as roughly outlined above, we can turn our attention to some of the variables that operate to affect the results. Some of these are stated by Deale in a recent contribution to *Mechanical Engineering*.<sup>5</sup>

Among the most important variables involved in metal cutting, those that should be painstakingly controlled and standardized, at least within the boundaries of the individual plant, are the following:

1. Tool form, including rake and clearance angles.
2. Cutting speed.
3. Feed.
4. Depth of cut.



**Table II**  
**Recommended Practice With Haynes J-Metal**

**Average Cutting Speeds and Feeds for Turning, Facing and Boring**

Material	Hard Cast Iron		Medium Cast Iron		Bronze		Malleable Iron		Steel Castings		S A E 3115		Cold Rolled Stock	
Type of Cut	Cutting Speed Ft. per min.	Feed per Rev. Inches	Cutting Speed Ft. per min.	Feed per Rev. Inches	Cutting Speed Ft. per min.	Feed per Rev. Inches	Cutting Speed Ft. per min.	Feed per Rev. Inches	Cutting Speed Ft. per min.	Feed per Rev. Inches	Cutting Speed Ft. per min.	Feed per Rev. Inches	Cutting Speed Ft. per min.	Feed per Rev. Inches
Rough Turn	100	.035	125	.050	219	.035	188	.035	125	.025	180	.033	344	.033
Finish Turn	163	.035	188	.050	313	.025	281	.035	300	.018	331	.015	488	.015
Rough Face	100	.035	125	.050	219	.035	188	.035	125	.025	180	.033	344	.033
Finish Face	163	.035	188	.050	313	.025	281	.035	300	.018	331	.015	488	.015
Rough Bore	88	.035	100	.050	219	.035	156	.035	113	.025	163	.025	300	.025
Finish Bore	163	.035	188	.050	313	.025	281	.035	300	.018	250	.015	375	.015

NOTE—Cutting speeds and feeds on cast iron may be increased if a coolant is used. Use water and sufficient soluble oil to prevent rusting of work.

**Average Cutting Speeds for Milling Cast Iron or Semi-Steel**

Rough Milling .....	{	Line type machine	100-120 feet per minute
		Drum " "	120-140 " " "
Rough and Finish Milling—one cut .....	{	Line type machine	125-140 " " "
		Drum " "	140-160 " " "
For Finish Milling best results are obtained at .....			175-200 " " "

The speeds and feeds shown in these charts are conservative and represent average practice on production jobs. The speed and feed of a job are governed by the structure and hardness of the part machined, amount of metal removed and the condition of the machine and fixtures. Therefore, the figures cannot be accepted as applicable to every job, but will serve as a starting point.

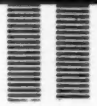




Table III

Cutting Speeds, Feeds and Depths of Cuts  
For Widia Cutting Tools

Material To Be Machined		Recommended Average For:	
		Roughing	Finishing
Stainless Steel (About 235 Brin- ell Hardness)	Speed (feet per min.)	115-150	200-230
	Feed (inches per rev.)	7-.040	0.008
	Depth of Cut (inches)	0.160-0.320	approx. 0.040
Chilled Cast Iron (75-90 Sclero- scope)	Speed	13-20	13-30
	Feed	0.080-0.120	0.160-0.320
	Depth of Cut	0.120-0.240	approx. 0.040
Bronze	Speed	980	980-1650
	Feed	0.040	0.008
	Depth of Cut	0.20-0.40	approx. 0.040
Aluminum	Speed	3300	4000
	Feed	0.040	0.008
	Depth of Cut	0.20-0.40	approx. 0.040
Cast Iron Up To 200 Brinell	Speed	250-330	260-400
	Feed	0.040-0.080	0.008
	Depth of Cut	0.20-0.40	approx. 0.040
Cast Iron (From 200 to 400 Brinell)	Speed	130-245	165-260
	Feed	0.040-0.080	0.008
	Depth of Cut	0.20-0.40	approx. 0.040
Drilling of Marble	Speed	72	1/2" hole time 8 sec.
	Feed		depth 7/8"
	Depth of Cut		
Glass	Speed	130-200	200-330
	Feed	0.004-0.016	0.004-0.008
	Depth of Cut	0.040-0.120	0.004-0.008
Porcelain According to Hardness	Speed	20-65	35-100
	Feed	0.020	approx. 0.008
	Depth of Cut	0.020-0.040	approx. 0.020
Armature Copper	Speed	approx. 820	approx. 1050
	Feed	approx. 0.040	approx. 0.008
	Depth of Cut	approx. 0.20	approx. 0.008
Hard Rubber & Fibre Composi- tions	Speed	650	980
	Feed	0.012-0.020	0.012-0.020
	Depth of Cut	0.040-0.240	0.020-0.040

5. Tool material and heat treatment.
6. Cutting fluid.
7. Machine tool and its condition.
8. Quality of finish.

Under present conditions and for some time to come, the information concerning recommended speeds, feeds, and depth of cut should be

considered as being purely qualitative. The establishment of standards is governed entirely by the conditions of each individual job, particularly in the relation of the variables mentioned above. Consequently, the general practice of the Carboloy Co. when working on a new application is to start the set-up with a 100 per cent increase in speed and a 33 1/3 per cent decrease in feed. From this point adjustments are made both in speeds and feeds, upward or downward as the case may be, to achieve the most economical performance.

For high production, tool life is

easily one of the most important factors in the selection of a cutting tool material. While Deale and others recommend the Taylor equation in which tool life is given in minutes, it would seem that for practical purposes the best way of expressing tool life is in terms of the number of pieces of work produced between grinds. Certainly this figure means more to the production man.

Economy being an essential in the manufacture of any product, the production man must be alive to the savings possible with the proper cutting tool materials. This is brought out quite pointedly in the following excerpt from recent correspondence with the consulting metallurgist of one of the important tool manufacturers. "It is true, of course, that the speeds, feeds, depth of cuts, etc., usually employed in the automotive plant demand tools made of high-speed steel. But on certain operations where carbon steel tools undoubtedly would work satisfactorily, this class of industry will use nothing but tools made of high-speed steel. In the case of taps, the large majority of automotive plants use nothing but high-speed steel ground thread taps, although on certain operations where great accuracy is not required, a longer life will be obtained from the lower-priced, high-speed steel, cut-thread tap."

Perhaps the biggest contribution of the cemented carbides came in the realization that metal could be cut at speeds higher than had previously been considered practicable. Although at the outset this tendency was greatly retarded by the limitations of existing machine tool equipment, the machine tool industry took up the gage almost immediately and practically overnight placed on the market a variety of machine tools capable of an unusual order of high speed. These machine tools were of massive construction with unusually heavy bearings, spindles, etc., designed to produce absolute rigidity and absence of vibration so essential to fine work.

What with tool engineers thinking more seriously about higher speeds, and higher speeds becoming available, it was suddenly discovered that high-speed steel tools also are capable of speeds hitherto untried. So it has become almost axiomatic that machine shop economy is intimately tied up with modernized machine tools capable of high speeds and possessing the needed rigidity which goes with

the faster tempo of production. Therefore we may confidently expect that as production improves and modernization of equipment proceeds apace, we shall approach an era of production economies unattained even in the fast-moving automotive industry.

While we are on the subject, it might be well to note in passing the possibility of getting still more out of the commonly-used tool steels through the auxiliary processes of chromium plating and nitriding. The possibilities of chromium plating on certain types of tools such as drills, reamers, files, inspection gages, and the like, are practically unplumbed. Some idea of the current activity in this direction was given by the author in an article about a year ago<sup>6</sup>.

Nitriding is a comparative newcomer in the field of metal cutting. An interesting application of this method is found in the long boring bars such as are used for crankcase boring operations. One make of bar is of Nitralloy with a nitrided case, the chief advantage being the fact that it is free from strains or even minute warpage due to the relatively low temperature at which the nitrided case is produced.

A better knowledge of the properties and limitations of the commercially available cutting tool materials is producing an advance in tool engineering along novel lines. For example, certain machining requirements may best be met by composite tools which use a combination of several materials. One example of this is a reamer with inserted blades in which the principal cutting edges are composed of one of the cemented carbides, secondary cutting edges of high-speed steel, while the body is of machinery steel. Other examples are: milling cutters with inserted blades tipped with cemented carbide or Stellite, and drills tipped with cemented carbide.

The limitations of certain types of high-grade tool steels, particularly the difficulty and expense of fabricating them into large dies, are being overcome by the newly developed technique of welded die construction. Here the main body of large dies, such as fender dies, body dies, etc., is made up largely of rolled mild steel or boiler plate sections welded together into a strong, rigid unit to which are fitted the principal alloy steel sections.

What may we expect of the future in the field of metal cutting? According to Emmons there is

much experimental work in progress in many directions, some of which is rapidly approaching the stage of commercialization. It may be confidently expected that the near future will bring forth tool steels which are better than those now in use as well as some that are cheaper. The field of the non-ferrous hard metal compositions such as the cemented carbides has hardly been scratched, and further improvements in quality and reduction in production costs seem well

within the realm of possibility.

Hand-in-hand with this development of cutting tool materials will come the widespread modernization of machine tool equipment which will make possible the best utilization of the qualities inherent in cutting tools. Neither the cemented carbides nor the high-speed tool steels can give their best with existing equipment.

<sup>6</sup> "Chromium Plating Cutting Tools Multiplies Wear Life," by Joseph Geschell, *Automotive Industries*, May 21, 1932.

## As We Go to Press

First figures, showing the effects of NRA, have been furnished General Johnson by APEM Executive Vice-President Carlton. They show pay-rolls for the first weeks of September were 70 per cent above average for first six months of 1933. The figures cover 850 members. Wage increases in the industry on the per-hour basis were released as follows:

August, 1933	\$0.5435 per hour	1930	0.5773 per hour
First 6 mos., 1933	0.4529	1931	0.5463
1928	0.5837	1932	0.4850
1929	0.5861		

Hearing on the code for Diesel engine manufacturers set for Washington Hotel, Nov. 22.

Gear manufacturers' code hearing lasts 20 minutes. Main question discussed was whether machinery manufacturers producing replacement gears for their products should come under gear code for this part of their business. Consensus seemed to be that they should not unless they went into general gear business.

National Labor Board announces that 58 settlements have been effected in Michigan tool and die makers' strike. Included in settlements are Packard, Hudson and Fisher.

Approval of tool and die code expected this week. Finance company code also awaiting approval.

Summary of the monthly report on General Motors sales follows:

	Oct., 1933	Sept., 1933	Oct., 1932	Ten Months 1933	1932
Sales to U. S. consumers.	63,518	71,458	34,694	708,410	477,288
Sales to U. S. dealers...	41,982	67,733	5,810	714,527	426,353
World sales .....	53,054	81,148	10,924	837,356	503,247

The figures show a decrease in domestic dealer stocks of new cars of about 22,000 in October and of about 27,000 since the mid-summer high. Export sales totaled 11,072 in October against 13,415 in September.

Hearing on the code for the conveyor and material preparation equipment industry will be held in the Washington Hotel, Nov. 24.

Sterling Motor Truck Co., Inc., has filed a security registration statement with the Federal Trade Commission covering issue of \$742,546.

Reported that Willys Overland plant will close Dec. 1 at completion of I. H. C. contract. Action followed court decision refusing to allow receivers to expend cash for new model development.

Mack reports third quarter loss after charges of \$567,211 against loss of \$961,775 last year.

McCord Radiator and Mfg. Co. reports net profit of \$5,167 in third quarter against \$39,352 net loss in similar 1932 quarter.

A plan for selling 10,000 \$700 planes to private flying enthusiasts by next spring has been announced by Eugene L. Vidal, director of aeronautics, Department of Commerce. A memorandum has been addressed to 34,000 licensed and student pilots, and licensed mechanics asking them if they would purchase such a plane if it was made available. They are also asked to canvass their friends. Mr. Vidal says "it is a comparatively easy task" to turn out a low-wing monoplane of the type in mind to sell at \$700 if volume production can be attained.



# How the Automobile Industry Itself by Helping the C.F.R.

by A. Ludlow Clayden

Sun Oil Company \*

A. L. Clayden  
Says—

Automobile design is dictated by the sales executive of the manufacturers, and there are two sorts of dictation. . . . Between the two the automobile engineer has little opportunity to develop improvements with the thoroughness he would like.

\* \* \*

Let us get together and decide to work along mutual lines so that fuels and engines will keep in coordination. Remember this cannot be done by the type of men who make up the C.F.R. . . . It is the executives of the twin industries that must make the agreement if any such agreement is to be made. It is men like those composing the boards of directors of this Institute and of the National Automobile Chamber of Commerce.

\* \* \*

To show that cooperation is possible, we have only to look at the extreme pressure lubricant situation.

\* \* \*

Automobile engineers almost universally insist upon thinking in terms of new cars. The oil supplier has to think in terms of cars in the 20,000-40,000-mile condition.

\* \* \*

The fewer different products called for, the greater the probability of the right one being used.

THE two industries of automobile manufacture and petroleum refining are partners in the same business. Whether they wish it or not, whether they realize it or not, the fact remains. The petroleum industry has the wider scope in that it extends into fields foreign to the automobile, but the common ground is by far the larger part. Oil made the automobile possible. It was the assurance of an ample supply of cheap fuel that made automobile manufacture a safe venture.

If we say that the automobile age started about 1898—and it was about then that it began to be believed in by the engineering profession—then we may also say that for a quarter of a century the oil industry was content to benefit from the immense new market being developed for it, and gave hardly a thought to helping in the development of the automobile. Of course, in a sense the automobile was given help of the most vital sort by the covering of the country with gasoline stations, but this is not the sense in which I am using the word "help."

Shortly after the end of the war it began to become obvious that the development of the gasoline engine was being restrained by lack of fuel suitable for high compression. More recently we have seen a similar situation with respect to lubricants; and we are probably now only at the beginning of both these things. The past 10 years have seen the development of a cooperative spirit. The two industries have a common customer. To satisfy that customer, automobiles and petroleum products must "fit" each other, and the individual freedom of action of each of the two partners is very limited. The first general perception of this fundamental fact led to the creation of the Co-operative Fuel Research Committee. The work of that body has been slow, in some ways clumsy and inefficient; but whatever criticism of detail may be made, the C. F. R. can justly claim large credit for bringing about a pro-

\* Paper presented before the American Petroleum Institute.



# Oil Industry Can Help Automobile Industry

found change in the relative attitude of the two industries. Automobile and petroleum technical men now know each other, understand each other, and really do try to help each other. An honest effort at cooperation has displaced the former attitude of mutual suspicion and distrust.

But the technical men are only a part of either industry. They are the basic part, no doubt—no product can be marketed until it is manufactured—but with all due respect to Emerson, paths are not worn to the doors of superlative mouse-trap makers unless there are guides to point the road. The salesman and the advertising writer render a service to the customer at least as great as to the manufacturer. It is in this great merchandising field that the significance of the oil-auto partnership remains yet to be realized.

Now it is my task to regard this from the viewpoint of one partner. I shall not pause to criticize the merchandising division of my own industry. I shall resist the very strong temptation to hand back to that division some of the responsibilities it has unjustly placed upon the groaning backs of the technologists. My criticism must be confined to the sales side of the automobile industry, and I doubt not that the latter can readily respond by prodding the soft spots of the oil salesman.

Automobile design is dictated by the sales executive of the manufacturers, and there are two sorts of dictation. When something new, like four-wheel brakes or balloon tires, is developed by engineers, it usually lies dormant for years. Finally, one sales executive visualizes a sales campaign involving the novelty. Then comes the deluge; for every other automobile maker must follow suit. Whether he believes in the device or not, whether his engineers are ready or not, makes but little difference. The other sort of sales pressure is not to demand any particular feature of design, but to insist on more power, greater quietness, easier steering, or something of that order. Between the two the automobile engineer has little opportunity to develop improvements with the thoroughness which he would like.

Now, of course, not all of these things have any direct recoil upon the oil industry, but we have recently had

a very fine example of the first sort in the case of free wheeling. When introduced by, I think, Studebaker, this age-old device was rushed onto almost every car in a matter of months. Engineers were compelled to use devices of which they did not approve. To protect themselves against anticipated trouble, laboratory tests were rushed through and a hasty conclusion reached that special lubricants would be needed. That such oils were not generally available did not in any way restrain the automobile manufacturers, who called upon the oil industry to shoulder the responsibility for the poor design of an ill-considered mechanism. The oil industry came to the rescue. At a very considerable expense in a year of poor business, it made available, all over the world, a

special series of oils; only to discover a few months later that there was no demand for them, no necessity for them, and no possible prospect of profitably disposing of them. It had been made the goat for the automobile salesman, and this fact is not going to be forgotten in a hurry.

Typically of the other sort of development, the sales division of the automobile industry has called for more and more power from cheaper and cheaper engines. This has practically compelled engineers progressively to raise compression pressures, while the cheapness side of demand has restrained them from incorporating detail improvements in engine construction which really should accompany high compression. A poorly-designed high-compression engine needs fuel of a considerably higher anti-detonating quality than does a perfectly designed motor of equivalent power output. The result is that many of the present models of popular cars are on the ragged edge of performance with the average gasoline available in sections where the octane average is high. These cars can only be made to perform smoothly in low-octane territories by so changing their adjustment that their power possibilities are not realized. The oil industry is making every effort to catch up. This is costing money, and the gasoline market will not be enlarged, nor will the price obtainable be increased,



"Automobile men seem to have an amazing ignorance of how lubrication service is given."

as a result of raising the octane average for the whole United States. Meanwhile the automobile manufacturer is not getting credit for his engine improvement, because it is only in special territories or with special fuels that it can be realized.

Without question this introduces far the greatest thing the automobile industry can do for the oil industry right now. It can get together with the oil industry and establish a plan for mutual development of fuels and engines. Of course, there will always be good and poor automobiles and good and poor gasolines; but, with the latter, the difference between best and worst—at least in detonation—is shrinking, and will shrink still more. This general improvement is what the automobile industry needs most. If it could be agreed that no popular cars would be built before 1936 with a C. F. R. octane requirement in excess of an agreed figure, this would permit the oil industry to give its attention to evening up the octane-rating average over the country, and also would allow more attention to be given to other features of gasoline. For instance, the power produced by an engine depends absolutely upon the amount of air that it can pump. If gasoline were much more volatile, larger carburetors and manifolds could

tirely by the type of men who make up the C. F. R. It can only be done if the merchandising branches of both industries realize both the possibilities and the limitations. It is the executives of the twin industries that must make the agreement if any such agreement is made. It is men like those composing the boards of directors of this Institute and of the Automobile Chamber of Commerce who alone can speak for their respective industries.

I have given an outstanding example of how not to do things by citing the history of free wheeling. To show that cooperation is possible and is, in fact, easy, we have only to look at the extreme-pressure-lubricant situation. This has been handled absolutely as it should be. Automobile makers want to use gearing that will take advantage of new steels. In passenger cars this would permit a saving of weight and cost. In large trucks and buses it would permit an increase in engine power. Owing to space limitations, axle gears can only be a certain maximum size; and this is now the neck of the bottle in truck design. Research financed by both industries is being conducted, and great progress has been made in a short time. This research shows how far the oil industry may reasonably be expected

fy the same customer, and we can do it if we work together. If the automobile salesman insists on complete freedom of action and refuses to cooperate, then every so often it is bound to get both industries into trouble with the ultimate consumer. Remember that automobile service departments have never been in the least hesitant in passing the buck by blaming oil products instead of admitting faulty mechanism. The oil industry has shown extraordinary patience in the face of this injustice. None the less, the most spineless of worms does turn occasionally; and, if the oil industry did decide to turn, it would be just too bad for the particular automobile it turned upon.

All the foregoing deals with obvious, simple facts; but the more obvious and the simpler facts are, the harder is it to get them realized. Hence, I make no excuse for verbosity or repetition. However, there are detail matters demanding joint attention which technical men can work upon without having to wait for a change in the attitude of their sales divisions. These things are much more complicated and so are much more likely to be given attention.

Automobile engineers want lighter engine oils used to give easier starting and to reduce engine friction. The automobile user wants minimum oil consumption. The oil industry sells the customer oil mileage and, therefore, heavy oil. Instruction books, charts, and light-oil propaganda are all useless waste of time and money until engines are built so that they will consume no more light than heavy oil. That the motorist should care nothing about gasoline economy and yet insist upon extreme parsimony with oil is one of those curious psychological phenomena that defy explanation. Yet here is a perfect example of the absolute necessity of satisfying the consumer. Oil consumption today is almost entirely a matter of oil viscosity; so it is up to engine designers, and to them alone, to solve this problem.

Here let me emphasize something of great importance which applies in many cases. *Automobile engineers almost universally insist upon thinking in terms of new cars. The oil supplier has to think of cars in the 20,000-40,000-mile condition.*

An excellent example of what this leads to is the increasing tendency to specify gear oils for chassis lubrication in automobile instruction books. Now, gear oils may be excellent in new cars, but greases will last twice as long, or more, in old cars. This means that the wise greasing station pays no attention to the instruction book, since the man who does this loses his customers to the man who does not.

Similarly, automobile men seem to have an amazing ignorance of how lubrication service is given. We now have seven S. A. E. motor oils, four S. A. E. transmission oils, three free-wheeling oils; and it has recently

---

**The manufacturer who wants a plus or minus of one second on a hundred vis. oil . . . might get rather a shock if he had an automobile rejected because the wheelbase was a thirty-second inch off.**

---

be used; there would be better distribution of fuel between different cylinders, and the volumetric efficiency of the engine would be considerably enhanced.

Let me ask here and now, is the automobile industry planning to change the design of intake systems so that only gasoline more volatile than the present average will be essential? If so, how fast will such changes be made, and what distillation curve may we expect to be asked for in 1936?

Probably the oil industry would prefer to work on volatility just now, because the possibilities for improvement in that respect appear much greater than do possibilities of any great increase in octane rating. Certainly, we do not want to make gasoline of better volatility if no advantage is to be taken thereof. But if we admit the impossibility of standing still—and most men do admit it—then let us get together and decide to work along mutual lines so that fuels and engines will keep in coordination.

Remember this cannot be done en-

to go; and, therefore, tells the automobile engineer what are his limitations. Meanwhile the automobile industry has refrained from forcing the issue. Undoubtedly this situation was helped by the calamitous experience of one automobile manufacturer who was a little over-sanguine in putting out a new model in fairly large production; but the cooperative movement was well under way before this happened.

Before putting out a new model with new features, the merchandising division of an automobile plant should take pains to be assured that the performance of the car does not depend upon the use of special fuels or special lubricants. Napoleon sent an army into Russia expecting it to be able to pick up its food on the road. We all know what happened to that army! This lesson needs to be impressed upon automobile sales executives.

If we are to interest these men, we must appeal to their self-interest. The oil industry does not ask for cooperation from its partner on any other basis. We are both seeking to satis-



been suggested that we add nine greases. Note that this totals 23 different products. These are supposed to be provided so that an automobile engineer can select and recommend whatever he wants of these 23 for his particular model. In actual fact, the car is going to be taken for service to stations where there is one grease, one transmission oil, and perhaps two motor oils. So, in the words of the immortal Goldburg, that list of 23 "doesn't mean anything." The oil salesman who tried to stock a dealer with 23 lubricants would assuredly get "skidoo" for an answer.

The fewer different products called for, the greater the probability of the right one being used. With 23 choices the chances are about 12 to 1 against the automobile man. There is absolutely nothing the oil industry can do about this. It has always been willing to make anything asked for, but it cannot force an unwanted article down the throat of an unwilling customer.

To be specific, there is no need for more than three motor oils if engine design is coordinated. There is no need for more than one viscosity range for transmission oil, and no need for more than one grease, with the proviso that the transmission oil and the grease might be wanted in summer and winter types. I do not mean that such a limited series of S. A. E. classification would suffice right now; although it represents the range used by at least 90 per cent of service stations. I mean it could be made to suffice if automobile engineers would consider simplicity of service as an outstanding necessity of good design. Let us at least try to set up simplified lubrication as an ideal to be striven for.

While on the topic of what engineers can do, there is a petty detail almost universally neglected which would be of great assistance in getting cars properly serviced. The complete removal of old lubricant from engines, transmissions, and differentials ought always to be possible. Actually these parts should be so designed that solvents can be used for cleansing with certainty that they will drain and not be trapped. The fine abrasive that collects is not removed by mere lubricant draining, and in far too many cases even the lubricant cannot be completely extracted. Incidentally, I have yet to see a steering gear with any provision made for draining it, despite which fact a good many engineers recommend the use of different lubricants summer and winter.

It might be in order to suggest that the Lubricants Division of the S. A. E. Standards Committee have its name changed to Lubrication Division, and that it take up such matters as mechanical design. Standards of recommended practice are even more needed with respect to the design of lubrication systems than they are regarding the characteristics of lubricants.

---

**The complete removal of old lubricants from engines, transmissions and differentials ought always to be possible.**

---

Turning to quite another phase of the oil-auto situation discloses a probable explanation for multiplicity of existing and suggested S. A. E. lubricant classifications. This is the habit automobile manufacturers have of writing factory specifications with total disregard for those of other manufacturers. One of the largest automobile producers has recently gathered together all the different specifications for petroleum products used by all its divisions. The list thus shows all the individual notions of all the chemists, engineers, and production managers; and any oil man looking at it with the right mental attitude will get a good laugh. If there were added to this compilation the oil specifications of all the other large automobile plants, no mere human laughter could begin to do justice to the absurdity disclosed.

Now let me admit—as I do most freely and fully—that many excellent new lubricants have been developed because some nut of an engineer insisted on having them. I am wholeheartedly opposed to statutory limitations on the freedom of the individual, be he man or corporation; but there is a middle ground. A good example is provided by the history of oil-field equipment. Here a concerted effort was made to simplify purchasing specifications by coordination, and in fairly short order literally hundreds of sizes of pipe and other simple units were discarded—to the complete satisfaction of all concerned. There were no laws made; in fact, since the job was done, a good many new sizes and

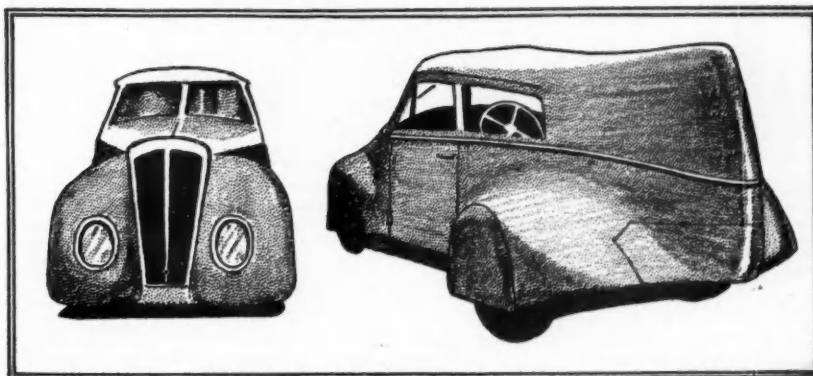
types have been added as changing circumstances made them necessary, and at no time was any driller prevented from buying what he wanted.

Facing us right now is a splendid opportunity to try out a scheme of coordination between automobile men. I refer to extreme-pressure lubricants for which specifications will soon begin to be written for the direct supply of automobile factories. If the old ways are followed, the refiner will be faced with the necessity of combining the same E. P. base in a dozen different proportions with 20 different straight oils, whereas two proportions in three oils would meet all conceivable requirements.

I often wonder what would happen if oil companies wrote specifications for the automobiles they buy. The manufacturer who wants a plus or minus of one second on a hundred vis. oil—and they do exist—might get rather a shock if he had an automobile rejected because the wheelbase was a thirty-second of an inch off. I can think of nothing more delightful than being given a free hand to set up automobile specifications conforming in principle with the oil specifications now generally in use by the automobile industry. Alas, that day will never come; but I believe we may look forward with confidence to the time when I can forget my present urge—to the time when the automobile industry will have abandoned the pious hope of finding 23 lubricants in every greasing station—to the time when their factory specifications will no longer excite my ribaldry.

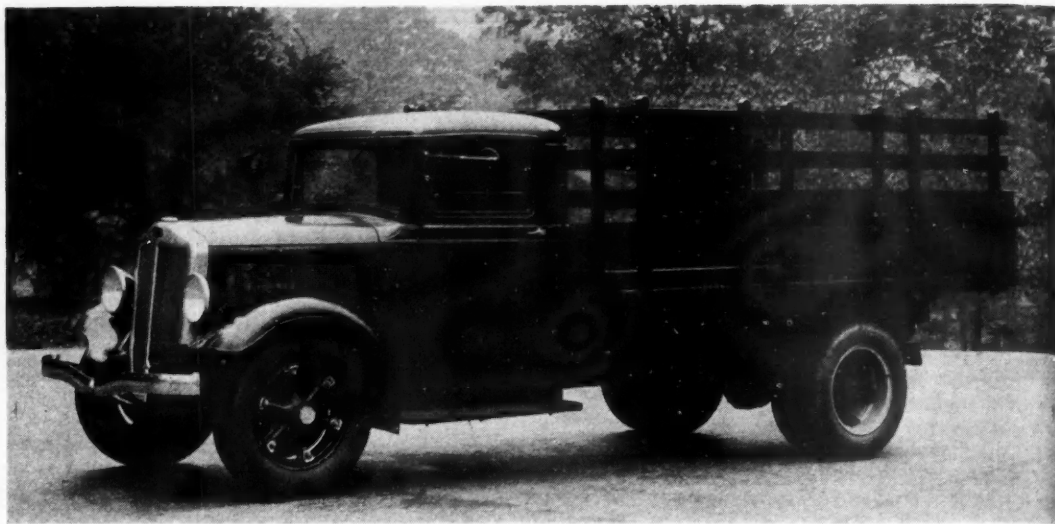
---

### Novel Stream-Lined Chenard et Walcker Displayed at the Paris Show





This view of the White Model 702 1¼-1½-ton truck shows the V-type sloping radiator grill, single-bar V bumper, hood grill and other features.



## White Offers New 1½ and 2 Ton Trucks at \$1,085 and \$1,185

by James W. Cottrell

Technical Editor, Commercial Car Journal

**T**WO new truck models at unprecedentedly low prices for the particular make have been announced by the White Co. of Cleveland, O. The Model 701, of 8,000 lb. gross weight and 1¼-1½ tons load rating, lists at \$1085 base

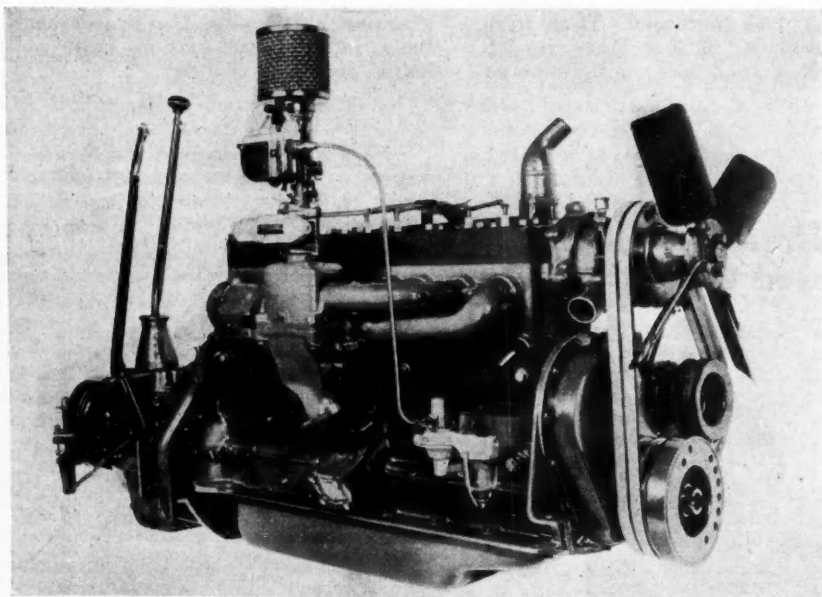
price, while the Model 702, which is similar in mechanical design but carries dual rear tires, has ratings of 11,000 lb. gross weight and 1½-2 tons load capacity and lists at a

base price of \$1185. These prices are said to be based upon anticipated volume production.

The six-cylinder engine has L-head cylinders of 3 5/16 in. bore and 4 5/8 in. stroke, making the displacement 240 cu. in. Its maximum torque is 150 lb.-ft. and its maximum output 68 hp. at 28 r.p.m., but the engine is governed to run at 2400 r.p.m. This gives a road speed of 50 m.p.h. with the fastest rear axle (5.1 ratio) and 35 m.p.h. with the slowest axle (6.86 ratio). The engine is supported on two rubber blocks at the front and through a plate-type engine bearer, clamped between the flywheel and transmission housings, at the rear.

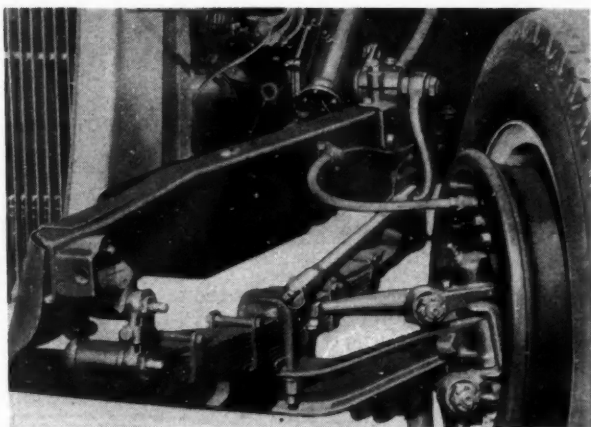
Full-pressure lubrication is provided to main, connecting-rod and piston-pin bearings. Piston pins float. The oil pump is mounted outside the crankcase and a special oil intake and oil filter are provided to prevent contamination of the oil delivered to the bearings.

As has been the regular practice in White commercial-vehicle engines for some time, Stellite exhaust-valve seat inserts are used. Plated cast-iron pistons are standard, as are steel-backed, babbitt-lined bearings. The four-bearing



The fan and pump are driven by twin V belts. A down-draft carburetor is fitted and is supplied with fuel by a mechanical pump.

The steering gear is mounted on top of the frame side rail. Front springs are shackled at the forward end.



crankshaft is provided with counterweights and a damper.

The oil pump and distributor are driven through an inclined shaft from a gear on the camshaft, while the water pump, fan and generator are driven through a double V belt, the tension of which is adjusted by moving the generator.

Power is transmitted through a single-plate dry clutch with automatic adjustment and ball-bearing throw-out, and through a four-speed transmission. The latter has case-hardened gears and its housing is provided with an opening for a power take-off. Ratios are 6.4, 3.0, 1.7 and 1. The gear lever is slightly offset, because there is a recess for the engine in the dash, this being necessitated by the forward location of the cab.

The rear axle housing, of the banjo type, is cast in one piece and is provided with pressed-in steel tubes. Wheels are mounted on taper roller bearings. The pinion is straddle-mounted.

Side rails of the frame are 7 x 2 25/32 x 7/32 in. and are heat-treated on the longer wheelbase (156 in.). Standard wheelbases are 132 and 156 in. Cross members are of frame depth and gusseted. Universal joints are of the needle-bearing type.

Cast-steel, spoke-type wheels are standard, but disk wheels are furnished on order at extra cost. The tire size is 7.00/20 in.

Fuel is carried in a 21½ gal. tank under the driver's seat, and is fed to the downdraft carburetor by a mechanical pump.

Driver comfort was given due consideration in the design. The cab is 60 in. wide and provides about 1½ in. more leg room than usual. The seat may be placed in any one of three positions and the same number of adjustments are provided on the steering gear. The

dash, toe boards and floor boards are insulated to reduce heat in the front compartment, and air for ventilation is directed against the toe boards.

The cooling system is designed to maintain the proper operating temperature under extreme conditions. A thermostat is used in the cylinder head top outlet and a thermostatically controlled radiator shutter can be placed behind the grill and serviced without removing the grill.

The water pump is bolted to the top of the cylinder water jacket and it extends above the top of the block forward of the cylinder head.

The back of the pump housing is closed with a steel plate. An extension of the pump housing carries an outboard bearing for the shaft, beyond which are located the double V pulley and the fan. The outboard bearing is of the double, tapered-roller, back-to-back type.

The oil filler tube and dip stick are on the left side, and the crankcase breather tube extends down on the right side at the rear of the block.

Front springs are shackled at the front and rear springs carry semi-elliptic helpers above the main springs. Drive and torque are taken through the rear springs. Springs have two leaves wrapped around the eyes, for safety.

Service brakes are hydraulic and are applied to the gun-iron drums by a B-K reaction-type vacuum cylinder. The hand brake at the rear of the transmission also has a gun-iron drum.

Front end styling is in line with modern tendencies in the truck field. While the characteristic White radiator outline is retained, the new models have a sloping V front with chrome-plated radiator shell and painted grill. A horizontal grill replaces the usual hood louvers and takes in most of the side of the hood. In cold weather the openings can be closed.

## Can the RIGHT Interpretation Confuse Section 7 A?

(Continued from page 578)

tivities for the purpose of collective bargaining or other mutual aid or protection; (2) no employee and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing or assisting a labor organization of his own choosing; and (3) employers shall comply with the maximum hours of labor, minimum rates of pay and other conditions of employment approved or prescribed by the President.

Without in any way attempting to qualify or modify by interpretation the foregoing requirements of the National Industrial Recovery Act, employers in this industry may exercise their right to select, retain or advance employees on the basis of individual merit, without regard to their member-

ship or non-membership in any organization.

It occurs in the approved automobile code.

If this be the right interpretation, why should the government be afraid to have it incorporated in every code? Does it not make for confusion to leave it out? How else can Mr. Green, who so eloquently interprets it otherwise for labor, be convinced?

### Norman Belt Tester

We are advised that the belt testing machine used by E. F. Houghton & Co., described in *Automotive Industries*, Oct. 7, 1933, is known as the Norman Endurance Testing Machine for Belts and is manufactured by the Tinius Olsen Testing Machine Co., Philadelphia, Pa.

# Parts and Equipment Code Minus Merit Clause Gets President Roosevelt's OK

Letter of Assent Quotes President's Interpretation of Section 7-A—Southern Manufacturers Get Lower Wage Minimums—Over 50 Supplemental Codes to Be Filed

WASHINGTON—President Roosevelt approved codes of fair competition for the Automotive Parts and Equipment Manufacturing Industry and the Motor Fire Apparatus Industry on Nov. 8.

He also approved a supplement to the automobile industry code establishing fair trade practices for the funeral vehicle and ambulance manufacturing division of the industry.

The code for the Automotive Parts and Equipment Manufacturing Industry as approved establishes a 40 hour maximum work week and a minimum wage of 40 cents an hour for male employees and 35 cents an hour for female employees engaged in manufacturing processes, except in plants located in North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas and Tennessee, where the minimum is to be not less than 87½ per cent of the minimum in the north. The NRA report says it is anticipated that the industry, with units in more than three hundred communities and in 40 states, will, under the code, restore employment to approximately 96 per cent of the number employed in 1928 and will effect an increase of \$1,250,000 in the weekly payroll or an increase of approximately 70 per cent over the average weekly payroll for the first six months of 1933.

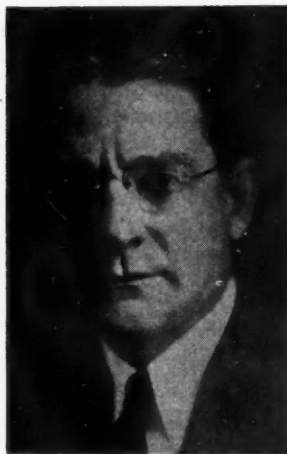
The code carries a requirement that employers shall post the labor provisions in a conspicuous place in their plants accessible to employees. It excepts only tires and batteries and the production of the enumerated articles when produced by a manufacturer for use exclusively in a finished product.

The "merit clause" has been eliminated. This revision is covered in the letter of assent to the President in which is included the President's own interpretation of this paragraph as contained in his letter to Gen. Johnson dated October 19. The code and the letter is signed by C. C. Carlton, A.P.E.M. executive vice-president, by the authority of the code committee consisting of Claire L. Barnes, C. P. Brewster, C. C. Carlton, C. S. Davis, J. H. Williams, and C. E. Wilson.

The Board of Directors of A.P.E.M. is now set up as the code authority.

Some 50 odd product group codes under the A.P.E.M. code are at present in various stages of completion. Three of these supplementary codes covering leaf springs, mufflers and hot-water heaters have already been

filed in Washington. It is expected that all of these supplementary codes will be completed before the end of this month.



Roy H. Faulkner, vice-president in charge of sales of the Pierce-Arrow Motor Car Company, who has been elected a member of the board of directors of the company on November 3

## Motor Wheels Earnings \$198,200 in Third Quarter

DETROIT—Motor Wheel Corporation for the third quarter reports a net profit of \$198,200 as compared with a loss of \$338,131 for the same period last year. This brings net profit for nine months this year to \$313,293, equivalent to 37 cents per share in spite of loss of roughly a quarter million dollars in first quarter.

Corporation reports orders from customers on hand totaling 1,750,000 wheels for delivery during next three months, representing largest number of wheel orders ever received by Motor Wheel at any one time. Shipments for next three months should exceed shipments for entire year of 1932.

Motor vehicle retailers in towns of 2500 and under, are not exempt from any of the provisions of the motor vehicle retailing code, according to an official ruling issued by NRA.

# NEW

## NACC Members Build 99,169 in October

Now Practically Certain That Industry Will Pass Two Million Mark in '33

NEW YORK—October production of members of the National Automobile Chamber of Commerce was 99,169, an increase of 415 per cent over October, 1932, but a decrease of 33 per cent from the 147,800 built in September, 1933.

Ford output is estimated at 33,000 in October, which would put the industry's output for the month at about 132,000, against 201,890 in September and 51,625 in October, last year, a decrease of 34 per cent from the preceding month, but an increase of approximately 300 per cent over last year.

In the first ten months of 1933, production of chamber members was 1,402,398, an increase of 63 per cent over last year.

The estimated industry output in October brings the total for ten months to 1,861,000, which makes necessary only a combined November-December output of 139,000 to put 1933 production over the 2,000,000 mark. Although November output will be the smallest in any month this year, resumption of production on new models in December should put the industry above the 2,000,000 level.

## NACC Gets Ford Data

NEW YORK—Wage and employment figures were received this week from the Ford Motor Co. by the National Automobile Chamber of Commerce. As was the case in the reports of a number of other manufacturers, the data received were not complete. The incomplete returns received indicate that the exact nature of the information desired has been misunderstood. These misunderstandings have been clarified and it is anticipated that complete reports will be available shortly.



# NEWS

## Rush to Buy Before Used Car Allowances Go Down Gives New Impetus to Car Sales

U. S. Retail Car and Truck Volume in October Now Estimated at 156,000—Current Retail Activity Is Regarded As Temporary—Car Shortages to Develop

by A. F. Denham

Field Editor, Automotive Industries

### Ford Meets Code Hours with One-Week Lay-Off

Fails to Act on NRA Offer to Consider an Exception

DETROIT—The Ford Motor Co. this week laid off half of its force at River Rouge to bring employment within the 35-hr. maximum average required by the automobile code. The other half of the force will be laid off next week. Each lay-off if understood to involve about 9000 men.

The NRA offer to consider a request for an exception in order to maintain employment, drew no reply from the Ford company.

Commenting on the lay-off, a company official is credited with saying "The company is taking this mandatory step in compliance with the new prohibition against work in this country. It seems possible to enforce that kind of prohibition."

When the news of the lay-off reached Washington, General Johnson said: "Mr. Ford's probable reason for laying off these 9000 men is that his production has fallen off seasonally. I do not know how fairly he has dealt with his average thirty-five hours and I will not know until I have seen the figures to be submitted September 7. But, if Mr. Ford wants to give work to any of these 9000 men he says he is laying off on a mandate, we will be glad to consider an exception permitting him to continue them all in employment."

### Hudson Reports Third Quarter Net Profit

DETROIT—Hudson Motor Car Co. reports profit after charges of \$19,043 for the third quarter against earnings of \$164,540 in the preceding quarter, and a net loss of \$1,497,760 in the third quarter last year. In the first nine months of 1933 the company's net loss after charges was \$1,307,422 as compared with a loss of \$4,630,010 for the same period last year.

DETROIT—An upswing in automobile sales during the closing weeks of October of unprecedented proportions has served to upset entirely earlier estimates of total car sales for that month. Final reports to factories by dealers indicate that domestic retail deliveries aggregated approximately 137,000 passenger cars, an increase of 117 per cent over last October and the best comparative showing by far this year.

Much of this upswing in sales which has continued over into November, early reports indicate, is attributed to impending effectiveness of the N.A.D.A. used car code reducing permissible allowances on used cars. The steady rise in sales which has been registered since a low point was reached in early October apparently is not confined to the low priced field, but extends over all price ranges and includes commercial cars and trucks.

As a matter of fact, reports so far available for the first week in November indicated that retail deliveries are running in excess of October sales.

It is not expected that this condition will continue throughout November and dropping off in sales after the middle of the month is anticipated. Nevertheless, the production tie-up on new models in combination with the sales rise is already beginning to introduce possibilities of acute new car shortages at some points and for some makes.

October commercial car and truck sales are estimated at roughly 29,000 units, based on fragmentary reports. This represents an increase of 80 per cent over last October. Combined car and truck deliveries of roughly 166,000 are more than double the figures for October last year.

Car stocks in the hands of Terraplane and Hudson dealers last week reached the lowest point since December, 1923, according to Chester G. Abbott, general sales manager of Hudson Motor Car Co. Retail sales for the week ending Oct. 28 were almost exactly the same as those for the previous week, and were 139.3 per cent of those for the corresponding week of 1932.

Retail deliveries of Dodge passenger cars last week totaled 2146, as compared with 1917 the week ending October 28. Deliveries of trucks similarly climbed from 957 to 1071 the week ending November 4.

Graham reports material increase in retail deliveries last two weeks over preceding period.

Final reports of October production for Chevrolet showed total of 37,699 cars and trucks compared with slightly under 60,000 in September and 1205 in October, last year. This brings total production for the first ten months of this year to roughly 609,000, compared with total of 394,000 for all of last year. All but approximately 3500 units went to dealers in this country.

Reo shipments in the month of October were twice as great as they were in October of 1932. Foreign business continues to show considerable improvement.

Studebaker sales in October approximated 6300 cars, exceeding the 1929 volume for that month by about 1000 units. Orders now on hand for November assures shipments of 7500, the largest total for that month since 1925.

For the sixth consecutive month, Pierce-Arrow shipments in October showed substantial increases over the corresponding month a year ago. Total shipments for the six-month period were 55 per cent ahead of last year.

New automobiles sold by De Soto dealers during the week ending Oct. 28 were 10.3 per cent greater than for the previous week and nearly six times as much as for the corresponding week in 1932.

### G.M. Dollar Volume Up 140% in Third Quarter

NEW YORK—The Sept. 30 statement of the General Motors Corp. reveals net sales of \$178,967,035 for the third quarter, against \$74,575,864 for the third quarter, 1932. The corresponding unit sales were 285,680 and 97,408. Third quarter net earnings after charges and taxes were \$33,341,618, against loss of \$4,464,229 last year.

For the first nine months, earnings were \$81,409,794, against \$10,555,175 in 1932. Balance sheet shows current assets of \$354,113,887, including \$180,782,124 cash and over \$51,000,000 in securities. Current liabilities were \$68,821,574.

# Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

There was a noticeable decline in general business activity last week. However, the increased buying power of the farmer resulting from crop marketing was expressed in stimulated sales of agricultural implements and automobiles and in an increased mail order business. A reversal of the downward trend in general business is expected with the approach of Christmas. Industrial activity last week fell off sharply, with steel operations at the lowest level since the latter part of April and below the level a year ago. An encouraging feature of the week was the strength in commodity markets.

## Freight Loadings Decline

Railway freight loadings during the week ended Oct. 28 totaled 636,674 cars, which marks a decrease of 13,808 cars below those during the preceding week, an increase of 19,390 cars above those a year ago, and a decrease of 103,689 cars below those two years ago.

## Food Prices Down Slightly

Average retail food prices in the United States during the two weeks ended Oct. 10 declined 0.1 per cent. However, the average was 19 per cent above the low point reached during April of this year.

## Power Production Steady

There was little change in the production of electricity by the electric light and power industry in the United States during the week ended Oct. 28, although the level during that period was 5.8 per cent above that a year ago.

## Borg-Warner Sales Well-Maintained

CHICAGO—Sales of Borg-Warner Corporation to the automotive industry were sustained for a longer time this year in any year since 1927, Charles S. Davis, president announces. Sales volume continues well ahead of 1932, but present indications point to a gradual recession in commitments until the automobile shows

## Farm Prices Improve

There were some gains in farm prices during the month ended Oct. 15, but these were offset by losses. The index of farm prices on that date was 14 points above that a year earlier, while the index of prices farmers pay for commodities was 11 points higher. The ratio of prices received to prices paid was 60, as against the low point of 49 in February of this year and 53 on Oct. 15, 1932.

## Oil Production Over 1932

Average daily crude oil production during the week ended Oct. 28 amounted to 2,358,150 barrels, as against 2,434,500 barrels for the preceding week and 2,096,600 barrels a year ago.

## Small Rise in Wholesale Commodity Prices

Professor Fisher's index of wholesale commodity prices for the week ended Nov. 4 stood at 71.8, as against 71.6 the week before, 71.5 two weeks before, and 72.2, the year's high, for the week ended Oct. 14.

## Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Nov. 1 showed increases of \$20,000,000 in holdings of government securities and of \$2,000,000 in holdings of discounted bills. Bills bought in the open market remained unchanged. The reserve ratio on Nov. 1 stood at 62.5 per cent, as against 65.5 per cent for both a week and two weeks earlier.

are inaugurated in January. Despite a small decline in recent weeks, the company's employment is considerably greater than last year, Mr. Davis states.

## Satchell Re-elected

CHICAGO—E. T. Satchell of Allentown, Pa., was reelected president of the Motor and Equipment Wholesalers Association at its annual meeting held here.

## Truck Operators Fight New Store-Door Tariffs

A.T.A. also Protests Anti-Truck Rules in Three NRA Codes

WASHINGTON, D. C.—Protest against store-door delivery tariff of the Pennsylvania and other railroads will be made by American Trucking Associations, Inc., and is now being prepared by its counsel, E. S. Brashears. Other railroads which have joined the Pennsylvania in this tariff are the Boston and Maine, Erie, New Haven, Canadian Pacific, Central Vermont, Delaware and Hudson, Maine Central, Montpelier and Wells River, St. Johnsbury and Lake Champlain, the Rosslyn connecting and the Sun Cook Valley.

Protest has been entered by A.T.A. on the proposed code of fair competition for the Structural Steel and Iron Fabricating Industry against provisions in that code that all such products should be sold at estimated price which would be the basing point price plus all-rail published freight tariff to point of delivery, or, if the point of delivery was at the basing point, plus the published tariff switching charge. A.T.A. also is taking exception to the code of fair competition for the Bolt, Nut and Rivet Industry. This code provides that all such products shall be sold at the basing point price plus all-rail published rates of freight or at such other rate of freight as the code authority of that industry may designate. This provision is very similar to that which appeared in the Iron and Steel Code.

Following conferences at the National Recovery Administration where vigorous protest was made against the continued applications of rulings by this code authority which were discriminating against truck operators, A.T.A. was invited to send a committee to work out this matter with the Traffic Manager's Committee of the American Iron and Steel Institute. While this invitation has been accepted, we are continuing to urgently request that these discriminatory rulings be suspended until such time as a satisfactory solution may be arrived at.

## Millholland Purchase

INDIANAPOLIS—The Millholland Sales Co. has purchased the goodwill, jigs, fixtures and inventory of parts of the Millholland Corporation which formerly made the Millholland automatic drilling machines and automatic units.

## Lemon Locates in New York

NEW YORK—Burton J. Lemon, field engineer of the U. S. Rubber Co., is now located at the company's New York office, 1790 Broadway.

## GM Declares Extra of 25¢ on Common

Directors OK Dividends  
Totaling \$24,000,000

NEW YORK—General Motors this week added \$10,875,000 to the purchasing power of its stockholders when it declared an extra dividend of 25 cents on the common, in addition to the regular 25 cent quarterly dividend. Both the regular and extra payments will be made Dec. 12. The regular quarterly dividend of \$1.25 on the \$5 preferred stock also was declared payable Feb. 1, 1934.

Commenting upon the payment of the extra dividend, Alfred P. Sloan, Jr., president, stated that the directors, recognizing the unusually strong financial position of the corporation, and giving weight to the earnings for the first nine months, as already reported to the stockholders, felt it desirable to do all possible to add to the purchasing power at this time and to support the efforts that are being made towards national recovery. The extra dividend declared will represent an additional disbursement of approximately \$11,000,000 which with the regular dividends, means a distribution of approximately \$24,000,000 through approximately 350,000 stockholders.

### Edward T. Birdsall

NEW ROCHELLE, N. Y.—Edward T. Birdsall, automotive engineer and prime-mover in the formation of the Society of Automotive Engineers, died at his home here, on Nov. 6, aged 70. Mr. Birdsall graduated as mechanical engineer from Stevens Institute of Technology, Hoboken, N. J., in 1886. After working for the Manhattan Elevated Railway Company in New York for a while he served as electrical engineer in many New York public buildings and for the New York Edison Company.

At the beginning of the century he was connected as engineer with the Desberon Motor Company of Brooklyn in the development of a steam truck, which, however, did not reach the commercial stage. It was some



Edward T. Birdsall

years later that he conceived the idea of organizing the technical men of the automobile industry into an engineering society, and as a result of his efforts the Society of Automobile Engineers was formed, Birdsall becoming its first secretary, which in those early days was a spare-time job.

During his long career, Birdsall was connected with numerous firms in the automobile and parts business. About a decade ago he became associated with the Wright Aeronautical Corporation. After the reorganization of that concern some years ago he joined Charles L. Lawrence, former president of the corporation, in aeronautical development work, devoting a good deal of his time to research on Diesel engines for aircraft.

### Leach Heads Alloy Division

CHICAGO—W. K. Leach, formerly with General Alloys Company of Boston, is now associated with the American Manganese Steel Company as general manager of the alloy division. Mr. Leach is located at the company's plant in St. Louis.

### Hygrade Products Moves

NEW YORK—Hygrade Products Company, manufacturers of automotive accessories, has moved to 560 West 34th Street, where increased manufacturing facilities have been secured.

## Organize to Exploit Diesel in Dominion

Canadian Company Is  
Headed by E. H. Gurney

TORONTO—A new venture has been launched in the Canadian automotive field to provide and promote the use of commercial vehicles incorporating Diesel oil engines.

The new company, which is known as the Diesel Transportation Equipment, Limited, is backed by important interests and the incorporation of the enterprise has attracted no little attention. The president of the company is E. Holt Gurney, who is president of Gurney Foundry Company, Limited, Toronto, one of the oldest and best known concerns in the Canadian manufacturing field.

Of considerable interest is the fact that the sales manager of Diesel Transportation Equipment, Limited, is Major J. Lee Jackson, formerly sales manager of Leyland Motors, Limited, Toronto, and prominently identified for years with engineering factors in connection with road transportation in the Dominion. Major Jackson will also take care of service requirements with the Diesel-engined coach and freight vehicles which will be placed on the Canadian market.

No intimation has yet been given regarding the design or type of road units which will be developed by the new company, other than that the power plant will be of the Diesel class.

### Bendix Reports Nine Mos. Net of \$1,096,367

CHICAGO—Net profit of Bendix Aviation Corporation and subsidiaries for the quarter ended Sept. 30 amounted to \$546,980 after charges and Federal taxes. This compares with \$816,849 in the preceding quarter and net loss of \$315,180 in the third quarter of 1932. For the first nine months of 1933, net profit was \$1,096,367, against net loss of \$367,307 for the corresponding period last year. The company's portion of net profit in affiliated companies not consolidated for the six months ended last June 30 was \$155,167, of which \$134,169 came from foreign companies.

## What Automobiles Cost in Commodities (Wholesale Prices)

\*The composite car price is the arithmetical average of the list prices of the Chevrolet Master, Essex 6 and 8, Ford, Plymouth and DeSoto standard four-door sedans.

	1933				1933							
	January, 1929	January, 1930	January, 1931	January, 1932	January	April	May	June	July	August	Sept.	October
Composite car price*	\$735	\$736	\$737	\$707	\$626	\$611	\$605	\$600	\$600	\$600	\$600	\$600
Pounds of beef.....	5,750	5,730	7,525	9,900	12,500	12,100	10,400	10,100	9,230	9,675	10,160	10,700
Pounds of pork.....	8,160	7,660	9,580	17,458	20,200	16,500	12,000	13,200	13,000	15,200	14,800	13,950
Bushels of corn.....	785	846	1,100	1,885	2,610	1,850	1,320	1,395	956	1,250	1,225	1,790
Bushels of wheat (No. 2 Red Winter)	530	589	840	1,270	1,310	915	752	795	534	690	684	878
Tons of coal (P'gh).....	433	526	546	589	696	678	673	667	667	480	600	333
Pounds of cotton.....	3,800	4,315	7,580	10,750	10,450	9,280	7,020	6,780	5,260	6,920	6,430	6,990



## Vesper Proposes Two Used Car Guide Plans

**Year's Guide Subscription Would Cost \$20 Under One and \$35 Under Other Plan**

ST. LOUIS—The used car guides required by the dealers' code will cost dealers \$12 yearly according to two proposals for financing their publication and code administration, presented by F. W. A. Vesper, chairman of the National Control Committee. The guides will be issued monthly and in some twenty odd sectional editions.

Plan No. 1 provides that the dealer pay \$20 made up of \$12 for the yearly subscription to the guide, \$4 for national code administration and \$4 for N.A.D.A. membership. Under this plan, additional subscriptions to the guide would be \$16 each, \$12 for the guide and \$4 for national administration. The theory behind the \$4 administration charge in the price for the second guide, is that this would help to distribute administration charges equitably inasmuch as it would be the larger dealers who would require more than one guide.

Plan No. 2 provides that the dealer pay \$35 for the first guide, \$20 of this charge would be distributed as under Plan No. 1. The remaining \$15 would be returned to the states to be used for state and local costs of administration. Under this plan, additional guide subscriptions would cost \$24, \$16 being distributed as in Plan No. 1 and \$8 balance going for state and local administration. Under this plan dealers who do not care to become members of any administrative organization can buy guides for \$31 for the first subscription and \$24 for the second, the \$4 difference for the first subscription representing N.A.D.A. dues.

The plans are offered as alternatives. The second plan is regarded as particularly adapted to states which are not highly organized for administration.

## Smith, Keating and Chase Become Regional Heads

William E. Holler, general sales manager of Chevrolet Motor Company, has appointed three new regional managers for the Chicago, Midwest and Southwest regions of the company.

G. I. Smith has been named regional manager of Chevrolet with headquarters in Chicago. Mr. Smith has been identified with Chevrolet since 1925, recently as Detroit zone manager.

T. H. Keating is the second regional manager to be announced by Mr. Holler. Mr. Keating assumes the sales leadership of the Midwest region with headquarters in St. Louis. He has had many years of experience with Chevrolet, most recently as zone

manager at Philadelphia. He succeeds A. W. L. Gilpin, new Pontiac sales manager.

Succeeding Felix Doran, Jr., who has been named assistant general sales manager, K. M. Chase is appointed regional manager of the Southwest region, with headquarters in Dallas. Chase too, has been with Chevrolet many years.

## U.S. Chamber Fails to Endorse Size Limits

WASHINGTON, D. C.—A proposal that each State should put into effect the size, weight and speed limitations endorsed by the American Association of State Highway Officials, was voted down, 1082 to 869, by the membership of the U. S. Chamber of Commerce in a referendum vote.

The Chamber membership in the same referendum approved seat-mileage taxes for buses, special user taxes for trucks, reasonable gasoline taxes levied only by the states, reciprocal licensing agreements, and intrastate and interstate regulation of motor carriers.

## Reo Advertising Manager Weds and Resigns

LANSING—The marriage of Mrs. Jessie M. Holt to Henry Croll of this city, took place Oct. 27 at the home of Dr. Martin Luther Fox, who performed the ceremony. Mrs. Croll has been assistant advertising manager of Reo Motor Car Company for the past five years, a position which she resigned on November 1.

## September Financing in Seasonal Decline

**Retail Drops 12 Per Cent and Wholesale 11**

WASHINGTON, D. C.—September retail automobile financing was 12 per cent under August while wholesale volume declined 11 per cent, paralleling the seasonal contraction in sales, according to the monthly Census Bureau summary of the operations of 429 companies. The number of units financed at retail in September decreased 13 per cent.

Comparable data are not available for last year, but it appears that wholesale financing in September, 1933, was nearly treble the 1932 figure, while retail financing was almost twice as large.

A summary of the data follows:

	September, 1933	August, 1933
Wholesale financing .....	\$52,234,146	\$70,669,569
Retail financing, dollars .....	\$65,157,519	\$74,283,295
Retail financing, units .....	182,881	209,501
Retail new car, dollars .....	\$42,012,778	\$48,681,241
Retail new car, units .....	80,658	94,303
Retail used car, dollars .....	\$21,876,807	\$24,229,062
Retail used car, units .....	98,418	111,020
Unclassified retail, dollars .....	\$ 1,267,934	\$ 1,267,934
Unclassified, units .....	3,805	4,178

## Curtice Names Chayne Buick Asst. Chief Engineer

FLINT, MICH.—Harlow H. Curtice, general manager of the Buick Motor Company, has announced the appointment of Charles A. Chayne as



Charles A. Chayne

assistant chief engineer of Buick. Mr. Chayne has been with the company since January 1, 1930, as motor engineer. Before that he was with Marmon for three years and with Lycoming a year, and five years as instructor in mechanical engineering at the Massachusetts Institute of Technology, of which he is a graduate. His engineering experience also includes service as mechanical engineer for the National Advisory Commission on Aeronautics.

Mr. Chayne succeeds Harold T. Youngren, who has been made chief engineer of Olds Motor Works.

## Tommy Milton in Fight for Life

DETROIT—Tommy Milton, well known race driver and at present connected with Packard engineering department, is fighting for his life in Harper hospital. He is suffering from an infection traceable to an old injury received a number of years ago in an Indianapolis race.

## Bradley a GM Director

NEW YORK—Albert Bradley, vice-president of General Motors, has been elected a director and a member of the corporation's finance committee.

## Strike Abandoned by Tool and Die Makers

**Fail to Gain Wage and Hour Demands Except in a Small Number of Cases**

DETROIT—The tide of victory in the automotive industry's first major battle under the NRA labor provisions definitely turned last week against the embattled Mechanic Educational Society, representing tool and die workers in the Detroit area.

There has been virtually complete abandonment of the strike in Detroit and Flint with Pontiac as the only major holdout point and this without major concessions on the part of manufacturers affected. Detroit regional labor board following its establishment here early last week upheld the Washington ruling that settlement of strikes should be negotiated with individual companies and offered its service to the M.E.S. only in such directions.

The net result was that the more radical element which apparently had been gaining power in the union was over-ruled and a decision to abandon the requirement for an all-embracing single settlement of the strike was abandoned.

This point had been the major point at issue recently preventing many men from returning to work. The society also abandoned its recent demands for material increases in wages and reduction in working hours. In some cases peace settlements call for slight increases in wages although this applies mainly to the smaller tool shops. The demand for signed agreements between manufacturers and the Society has also been abandoned in most cases.

While the strike is still effective theoretically in Pontiac employers there state that even if the strike were called off no large numbers of additional tool and die makers could be rehired at this time.

The outcome of the strike has served to vindicate and strengthen the industry's stand with regard to the much debated merit clause. Without doubt President Roosevelt's recent communication to General Johnson, interpreting the NRA labor clause in line with automobile producers' views has a considerable psychological effect in breaking the backbone of the strike.

## Still No Serious "Cracking Down"

PHILADELPHIA—October registrations of new Ford cars in the first seven states to report, represent 20.8 per cent of the total for all makes. This compares with Ford percentages of 21.6 and 22.0 in the same states in September and October. The decreases of .8 per cent from Septem-

ber and of 1.2 per cent from August, may be taken as qualitative indications of the extent of public "cracking down," although at this season of the year other factors affecting the Ford percentage might easily exercise an important influence.

The percentages of total business obtained by the three leaders in the low-priced field in the seven states for which October reports are available, follow:

	October	September	August
Ford .....	20.8	21.6	22.0
Chevrolet ...	34.2	33.1	32.7
Plymouth ...	20.3	20.1	19.3

## Chevrolet Celebrates 22nd Anniversary

DETROIT—The Chevrolet Motor Company celebrated its twenty-second birthday on Nov. 3. The company was organized in 1911 and production started on a modest scale, the output for the remainder of that year not exceeding five or six cars.

In 1912 production totalled 2999. During this period nearly the entire output was sold through retail stores in Chicago, Philadelphia and Boston.

In 1913 output was 6000 units which figure was increased to 69,000 in 1915. At this time the main Chevrolet plant was located in Flint. In 1916 additional plants were secured in Oakland, Calif., and Fort Worth, Texas.

Production exceeded the 100,000 mark for the first time in 1917 and early in the next year the assets of the company were purchased by General Motors.

## Midland Steel Statement

CLEVELAND — The Midland Steel Products Company reports net earnings after all charges but before Federal taxes of \$664,991 for the first three-quarters of 1933 against a net loss of \$434,137 in the similar 1932 period.

## Bus Operators Will Reduce Rates Dec. 1

CHICAGO—A general reduction in bus passenger rates for the entire United States, effective December 1, was announced at a meeting of the National Bus traffic association at the Congress hotel yesterday (Nov. 6). The reduction is necessary if bus lines are to meet railroad competition, L. G. Markel, of the Pacific Greyhound Lines and chairman of the association declared. He arrived from Washington where he attended a conference with government officials regarding the code authority under the bus code, signed October 31 by President Roosevelt and effective November 13.

The meeting was attended by 100 traffic managers of the nation's major bus lines.

## Capital Now Regards Ford Bids as Eligible

**Reply on Edgewater Strike Demands Considered as OK on Collective Bargaining**

WASHINGTON, D. C.—Any legal barriers to the acceptance of Ford bids by the government, are believed to have been swept away by Senator Wagner's statement late last week that Ford had accepted the principle of collective bargaining in the Edgewater dispute. While what Mr. Ford told General Johnson regarding his attitude on collective bargaining was always of very doubtful legal importance, the action taken in the Edgewater case appears to settle all argument on that score. Whether Mr. Ford's reputed lack of sympathy with the code will continue to bar his products, has not been revealed.

In its reply to the demands of the Edgewater strikers, the Ford company stated "When the law permits men to work forty hours a week, wages for forty hours will be paid and the company will maintain as far as business conditions permit its five day week of eight hours a day." The company pointed out that "recognition of collective bargaining through representatives of the workers' own choosing is already required by the National Industrial Recovery Act," and also promised that there would be "no discrimination made in the case of any applicant because of affiliation or non-affiliation with labor unions but every applicant will be considered strictly on the basis of his individual merit."

In reply, counsel for the strikers said that the Ford company has not said that it would recognize collective bargaining, but had merely cited the requirements of the law. It would appear, however, that the fact that the Ford company did make a reply to the demands of the chosen representatives of the strikers, constitutes recognition of collective bargaining. In a subsequent letter to General Johnson, the strikers said that employment averaged only 200 days a year, which made total earnings \$800, and asked for a formal hearing of their charges against the Ford Motor Co.

The only development in the controversy this week occurred when General Johnson referred to the Ford charge that he was assuming to talk like a dictator in a speech at Minneapolis. He said "The charge happens to come from a man who, entrenched in what he regards as an impregnable economic position of wealth and power, has exercised the most ruthless economic dictatorship of our time." In the same speech, he bitterly attacked critics of the recovery program and promised vigorous prosecution of chiselers.



## Bus Code Becomes Effective Nov. 13

State Regulatory Boards Given Interstate Powers

WASHINGTON, D. C.—Registration of all passenger motor carriers, adherence to published tariffs and the requirement that new interstate lines must get intrastate certificates for the states in which they operate, are among the features of the code of fair competition for the motor bus industry, approved by the President on Oct. 31. The code which becomes effective Nov. 13, covers all passenger motor carriers except school and hotel buses, taxicabs and buses operated under the Transit code.

All carriers are required to register all routes in operation with the code authority within 30 days after the approval date of the code. New routes must also be registered within 15 days of the beginning of service but before such new service can be inaugurated, the operator must secure intrastate certificates for each State in which the operation is conducted.

Carriers are required to file tariffs with the code authority within 20 days, and such tariffs must be adhered to until superseded by new schedules. They must also meet the bond and insurance requirement of the states in which they operate.

Maximum hours are set at 40 for clerical employees averaged over four weeks; 48 for garage and service employees and for bus operators and ticket agents averaged over six weeks period with 54 hour maximum in any one week. Watchmen and janitors may work 56 hours. No employee working over 35 hrs. per week may be employed more than 24 days in any 28 day period. Minimum wages are set on a sliding scale based on population and range from \$15 down to \$12 per week. It is estimated that the wage and hour provisions will re-employ 12,586 workers, and will increase payrolls by \$15,152,000, increases of about 18 per cent in both cases.

Questions of jurisdiction as between the transit and bus industries, are to be settled by the authorities for the respective codes.

The bus code authority in addition to administrative duties, is made the agent for the collection of data and is charged with the responsibility of recommending a uniform accounting system within 30 days.

## Cars of the Future to Have 3 Wheels

TORONTO—The automobile of the future will have three road wheels, reduced frontal area and the engine in the rear.

This, in a word, was what Frank S. Spring of Detroit, automobile en-

gineer, told the meeting of the Canadian Section, Society of Automotive Engineers, at the Royal York Hotel, Toronto, on Oct. 18, in offering a discussion on the trend of motor car design.

Mr. Spring declared that it was not possible to design a perfectly streamlined car with four wheels. Hence, the evolution in design would be the disappearance of one rear wheel. It would be necessary to place the two front wheels outside of the body proper. Cutting down wind resistance depended upon reducing the frontal area and this could not be done if the wheels had to be included in the front width of the body design.

The speaker predicted that engineers would soon have a car that could take-off from the ground and fly. As demonstrating the next best thing, currently in vogue, Mr. Spring flew from Detroit to Toronto for the meeting in an "ordinary" aeroplane and asserted that he had encountered two snowstorms en route.



E. W. Ivey, new general auditor of the Chevrolet Motor Co.

## Erie to Offer Store-Door Service Dec. 1

NEW YORK—Erie Railroad Co. will provide store-door delivery and collection of l.c.l. freight beginning Dec. 1, subject to approval of tariffs by the Interstate Commerce Commission. The railroad will pick up and deliver all shipments moving within a distance of 260 miles and which call for a minimum rate of 35 cents a hundred or more. For distances between 260 and 380 miles, the station-to-station rate will be charged plus 1 to 11 cents per hundred, depending on distance. For longer distances, the rate will be 6 cents a hundred for each service, that is 12 cents for both pick-up and delivery.

## Trucking Code Provides Regional Rate Control

NRA Will Hold Public Hearing on November 16

WASHINGTON, D. C.—Local and regional regulation of trucking rates is provided in the revised code of fair competition for the trucking industry submitted by the American Trucking Association, Inc. It is expected that public hearing on the code will be held on Nov. 16.

The code covers all transportation of property over public highways, except where such transportation is subject to some other code. Administration will be through national, regional, divisional, etc., code authorities. In addition to its administrative and enforcement duties, the national code authority is required to recommend a uniform accounting system to the administrator within 90 days.

The code requires that each member of the industry register his name, number and type of vehicles operated, etc. In return, registration certificates and insignia will be issued, and the insignia must be displayed on vehicles. Minimum rates and tariffs must be filed and no member of the industry may charge less except after filing new tariffs. Minimum rates and tariffs may be formulated by trade agreements among members of any territorial or natural group, but such rates and tariffs must be directly related to and not more than rates and tariffs prescribed by or on file with the appropriate state regulatory body, or be directly related to and not more than existing rates of competing railroads. Services must not be sold for less than the reasonable cost thereof, except that competition of operators with lower costs may be met.

Basic maximum hours are set at 48 averaged over a six-week period, except in emergencies such as the moving of perishable products. No employee may work more than 16 hours in any 24-hour period. Minimum wages are set up for northern and southern sections, the minimums being graduated according to population.

American Trucking Associations, Inc., is now putting on a 40-day campaign through local truck associations to secure registrations of truck owners in advance so that this job will not have to be done following the approval of the code.

## Bohn Earnings \$1,159,229

DETROIT—Bohn Aluminum & Brass Corp. reports net earnings, after depreciation, taxes, etc., of \$1,159,229 for the nine months ended Sept. 30 against a deficit of \$73,693 in the same period last year. Third quarter earnings were \$549,325 against \$509,302 in the preceding quarter and \$271 in the third quarter, 1932.



## Plane Output Gains in First Nine Mos.

Total Is 1065 Against 1020 in 1932—Transport Users Favor Monoplanes

WASHINGTON, D. C.—Airplanes manufactured in the United States during the first nine months of 1933 totaled 1065, of which 552 were for domestic civil use, it was announced today by Eugene L. Vidal, Director of Aeronautics. This represented a slight increase over the corresponding part of 1932.

A survey by the Aeronautics Branch, Department of Commerce, showed that the 552 airplanes built for civil use in this country during the period Jan. 1 to Sept. 30 included 410 monoplanes, 135 biplanes and seven autogiros. Of the monoplanes, 196 were open cockpit and 214 were cabin types. The biplanes included 41 open cockpit and 94 cabin craft.

Of the airplanes produced from Jan. 1 to Sept. 30, 1933, the total of 1065 was divided as follows: 552 for domestic civil use, 254 for military delivery, and 259, including civil and military, for delivery to purchasers in foreign countries.

The 552 for domestic civil use included 390 constructed by regular manufacturers who produced aircraft in quantity, and 162 built by manufacturers or individuals producing only one or two airplanes each.

In 1932, during the first nine months, manufacturers of airplanes produced 1020 aircraft. These included 506 for domestic civil use, 410 for military delivery, and 104 for export. Among the 506 airplanes manufactured for domestic use in the period January-September, 1932, were 364 monoplanes, 123 biplanes and 19 autogiros.

The full report on aircraft production for the first nine months of the year follows:

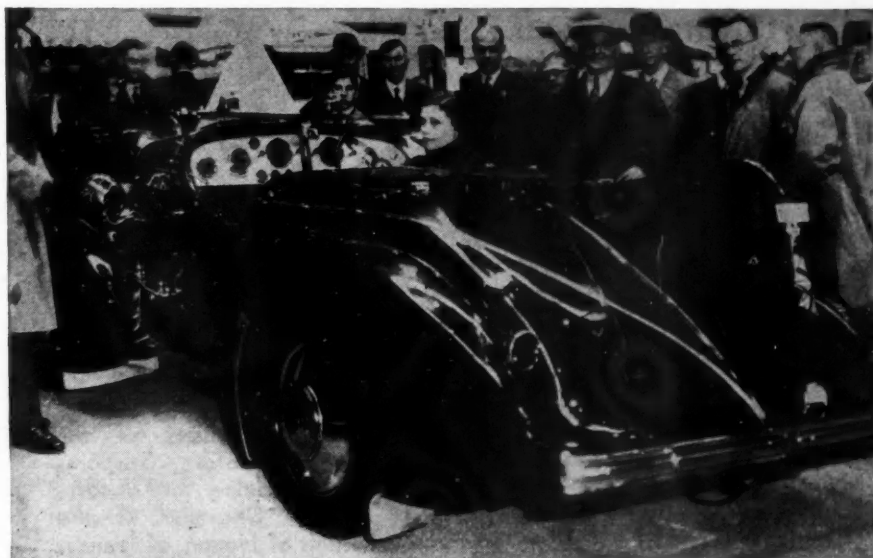
Report of aircraft production from Jan. 1, 1933 to Sept. 30, 1933. (Based on Department of Commerce licenses, identification marks issued for unlicensed aircraft, and reports as to military deliveries and aircraft exported which were manufactured during the first nine months of 1933.)

### Monoplanes:

Open cockpit (landplanes)	
One-place .....	44
Two-place .....	103
Three and four-place .....	45
Open cockpit amphibians, flying boats and sesquiplanes	4
Total, open .....	196
Cabin (landplanes)	
One to three-place .....	56
Four to seven-place .....	90
Eight-place and over .....	65 <sup>1</sup>
Cabin amphibians .....	3 <sup>2</sup>
Total, cabin .....	214
Total, monoplanes .....	410

### Biplanes:

Open cockpit (landplanes)	
One-place .....	5
Two-place .....	15
Three-place and over .....	21
Total, open .....	41



The price tag on this super-sports Ford V-8 says £560 (about \$2,500). It was one of the features of the London Show. Note the stabilizing fin on the rear deck.

Cabin (landplanes)	
Two to four-place .....	65 <sup>2</sup>
Eight-place and over .....	25 <sup>3</sup>
Cabin amphibians .....	4 <sup>4</sup>
Total, cabin .....	94
Total, biplanes .....	135
Autogiros .....	7
Total, domestic civil and commercial .....	552
Military airplane deliveries .....	254 <sup>5</sup>
Airplanes exported .....	259
Grand total .....	1,065

<sup>1</sup> Includes 64 multi-engine craft.

<sup>2</sup> Includes 1 multi-engine craft.

<sup>3</sup> Includes 24 multi-engine craft.

<sup>4</sup> Includes 3 multi-engine craft.

<sup>5</sup> Does not include planes listed in the above breakdown or planes exported in 1933 which were manufactured prior to Jan. 1, 1933.

## Fish Heads Chevrolet Commercial Car Sales

DETROIT—W. E. Fish has been appointed manager of the commercial car department of the Chevrolet Motor Company. He succeeds C. P. Fischen, who is now sales promotion manager for the company, replacing W. G. Lewellen. Mr. Lewellen is on special sales assignments in the central office—work formerly done by H. B. Hatch, recently named assistant general sales manager. Mr. Fish was recently assistant manager of the commercial car department, and entered the Chevrolet organization in the spring of 1931 as city truck manager at Pittsburgh. He since held assignments as truck manager at several regional points.

## Mullins Reports Loss

SALEM, OHIO—A net loss of \$156,594 in the first nine months of 1933 is reported by Mullins Mfg. Corp. This compares with a deficit of \$5,653 in the similar 1932 period.

## Sales Gains Increase Canadian Employment

TORONTO—Trade figures on sales and employment confirm the claim that an upward trend has been enjoyed in the automobile industry of Canada this year. Employment in the industry in October stood at 65.9, according to the index compilation, as compared with 46.0 a year ago and 59.6 in October, 1931. Sale figures for the domestic market show that purchases of new passenger cars increased from 35,581 for the nine months of 1932 to 36,173 this year.

More people are paying cash for their new cars, according to the statistics. In the first three-quarters of 1932, 42.7 per cent of the purchases were through financing corporations while this year only 33.9 per cent were obtained on time payments.

Most expansion is noted in the export business this year. During the last nine months Canadian manufacturers exported 14,505 units valued at \$6,013,526 as compared with 7942 units valued at \$3,228,139 in the first nine months of 1932, the increase being almost double in both units and valuation.

## Tyson Roller Bearing Gets British Patent

MASSILLON, O.—Tyson Roller Bearing Corp. of this city announces that it has been granted a British patent on the Tyson cageless tapered roller bearing. The list of countries in which patent on the bearing have been obtained in addition includes, United States, Canada, Belgium, Czechoslovakia, Sweden, Germany and France, the company states.

## Steel Buying Slow as Price Rise Talk Wanes

Advance in Bar Prices  
Is Still Regarded As  
A Possible Development

NEW YORK—Although most steel company sales managers do not look for any resumption of major contracting by automotive consumers before the latter part of December, quickening of activities in Detroit motor car plants, made possible by the reported settlement of the tool and diemakers' strike, is expected to yield in the next few weeks a somewhat better volume of orders for immediate shipment.

While automotive users in the aggregate have on hand at present more steel than they have usually carried in recent years, there are some exceptions from this general condition and enough business is believed to overhang the market to make for an improvement in the present operating rate from now on.

The American Iron & Steel Institute's figure of ingot operations for the current week is 25.2 per cent, as against 26.1 per cent of capacity during the preceding week. Finishing mills, however, are doing much better, especially so in the Youngstown district.

While the steel market is waiting for a fresh buying movement to develop, talk of impending price changes temporarily has come to a halt. Early in October it was thought that semi-finished steel prices would be revised upward, thus paving the way for another advance in sheets and strip steel. Paucity of buying by non-integrated rolling mills, which have been working down their reserves, has caused any such intention to be shelved for the time being. There is, however, still a possibility of some change in the price of steel cars, which have been marked up only \$3 per ton over the year's low, while the advance in sheet prices over the low amounts to \$7 a ton.

**Pig Iron**—Markets are generally quiet with the movement to foundries restricted to single carloads. Prices are unchanged.

**Aluminum**—Easy and quothably unchanged.

**Copper**—Progress in Code matters all along the line served to steady the market. A Code of Fair Competition for the Fabricated Metal Products and Copper and Brass Mills Products Industry is reported to have been approved while copper producers and custom smelters also expedited adjustment of their differences. The market remains quotable at 8c., delivered Connecticut Valley point.

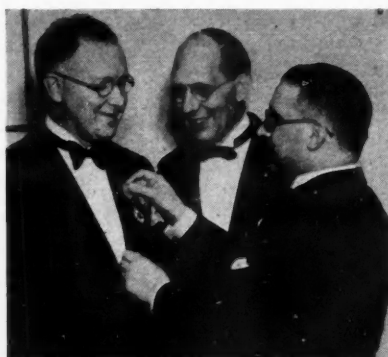
**Tin**—At the week's opening Straits tin for prompt delivery was quoted at a mere fraction below the 50c. level, the sharp advance in Sterling exchange having sent the current quotation to 49.90c.

**Lead**—Dull and unchanged.

**Zinc**—Steady and unchanged.

### C. R. Gall Is C. S. M.

TORONTO—C. R. Gall has been appointed assistant general sales manager of Hudson-Essex of Canada, Limited.



W. J. Davidson, one of ranking engineers of the General Motors Corporation, receiving the decoration of Chevalier of the Legion of Honor, of France, at a dinner given by some of his close friends at the Detroit Club, Oct. 26. The honor was conferred by Mr. Loon Morand, French Consul in Detroit. C. F. Kettering is the onlooker

### E. R. Macauley Weds

DETROIT—Edward R. Macauley, son of Alvan Macauley, president of Packard Motor Company, was married Saturday, Oct. 28, to Miss Margaret Truss.

### Frederick & Mitchell Agency Now Handling Nash Account

CHICAGO—Organization of the new advertising firm of Frederick & Mitchell, Inc., to handle the various advertising accounts formerly directed by the Green, Fulton, Cunningham Company, has been announced by Karl A. Frederick, president. Headquarters of the company will continue at 360 North Michigan avenue, and will include the same personnel that has for many years served Nash Motors Company and numerous other national advertisers.

Both Karl Frederick and Harry Mitchell, principals of the new organization, are widely known throughout advertising circles, particularly in the field of automobile advertising.

### Norman Bel Geddes to Design GM Medallion

NEW YORK—Norman Bel Geddes, noted artist, has been commissioned to design the medallion commemorating the twenty-fifth anniversary of General Motors, according to Alfred P. Sloan, Jr., president of General Motors Corporation.

The medallion, which will symbolize progress in motor transportation, will be utilized by General Motors in the observance of its silver anniversary, beginning this month and continuing through the New York Automobile Show into 1934.

## CALENDAR OF COMING EVENTS

### SHOWS

English Motorcycle & Cycle Show, Olympia	Nov. 25-Dec. 2
New York, Automobile Show	Jan. 6-13
Los Angeles, Automobile Show	Jan. 6-14
Toronto, Ont., Automobile Show	Jan. 13-20
Milwaukee, Wis., Automobile Show	Jan. 13-20
Newark, N. J., Automobile Show	Jan. 13-20
Cleveland, Ohio, Automobile Show	Jan. 13-20
Cincinnati, Ohio, Automobile Show	Jan. 14-20
Philadelphia, Pa., Automobile Show	Jan. 15-20
Detroit, Mich., Automobile Show	Jan. 20-27
Hartford, Conn., Automobile Show	Jan. 20-27
Baltimore, Md., Automobile Show	Jan. 20-27
Boston, Mass., Automobile Show	Jan. 20-27
San Francisco, Calif., Automobile Show	Jan. 20-27
Chicago Automobile Show	Jan. 27-Feb. 3
Washington, D. C., Automobile Show	Jan. 27-Feb. 3
Camden, N. J., Automobile Show	Feb. 3-10
Rapid City, S. D., Automobile Show	Feb. 7-10

Springfield, Ill., Automobile Show	Feb. 8-10
Kansas City, Mo., Automobile Show	Feb. 10-17
Black Hills, S. D., Automobile Show	Feb. 15-17
Evansville, Ind., Automobile Show	Feb. 20-24
Denver, Colo., Automobile Show	Feb. 20-28

### CONVENTION AND SHOW

Natl. Assoc. of Engine and Boat Mfrs., New York City	Jan. 19-27
--	------------

### CONVENTIONS

International Power & Engineering Conference, New York City	Dec. 3-8
---	----------

### MEETINGS

Perdue University, Welding Meeting, Lafayette, Ind.	Dec. 7-8
Natl. Automobile Dealers Assoc. Meeting, New York City	Jan. 3
Rubber Assoc. Meeting and Banquet, New York	Jan. 8
S.A.E. Annual Dinner, New York	Jan. 8
Motorcycle & Allied Trades Assoc. Annual Meeting, New York	Jan. 10
S.A.E. Annual Meeting, Detroit	Jan. 22-25

### CONFERENCE

Lafayette, Indiana, Welding Conference (Auspices of Purdue University)	Dec. 7-8
--	----------